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N14

INSTALLATION RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT

RECORD OF DECISION ON OPERABLE UNIT
GROUNDWATER REMEDIATION PROGRAM (GRP)
PHASE I: Boundary Groundwater Recovery System

N6.

INSTALLATION RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT

RECORD OF DECISION ON OPERABLE UNIT
GROUNDWATER REMEDIATION PROGRAM (GRP)
PHASE I: Boundary Groundwater Recovery System

SITE: Twin Cities Army Ammunition Plant (TCAAP), New Brighton, Minnesota.

DOCUMENTS REVIEWED:

I am basing my decision primarily on the following documents for implementation of the interim response action (operable unit) which, at a minimum, will be consistent with the final remedial action selected, following completion of the TCAAP Remedial Investigation/Feasibility Study (RI/FS) currently being conducted by the U.S. Army.

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Groundwater Remedial Action Alternative Analysis — February 1986

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Groundwater Remediation Program Plan (GRPP) — June 1986

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Groundwater Remediation Program
Boundary Groundwater Recovery System
Contract Documents and Specifications — August 1986

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Boundary Groundwater Recovery System (BGRS)
BGRS Extraction Well Pumping Test Report — March 1987

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Boundary Groundwater Recovery System (BGRS)
Quality Assurance Project Plan (QAPP)
BGRS Monitoring Program — March 1987

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Boundary Groundwater Recovery System (BGRS)
BGRS Monitoring Plan. March 1987

DESCRIPTION OF SELECTED REMEDY:

The TCAAP GRP, Phase I: BGRS is the first component of a contemplated three (3) phased Plant-wide system designed to address volatile organic compound (VOC) groundwater contamination originating from primary disposal sites at the Plant. The Program, in total, consists of the following:

TCAAP Groundwater Remediation Program

Phase I: Boundary Groundwater Recovery System (BGRS)
Phase II: TCAAP Groundwater Recovery System (TGRS)
Phase III: Plume Groundwater Recovery System (PGRS).

The Phase I: BGRS is designed to mitigate the transport of VOCs across the southwest boundary of TCAAP.

The Phase I: BGRS consists of the following:

-- Six (6) Hillside Extraction Wells designed and constructed for a maximum pump rate of 200 gpm per well.

-- Nine (9) monitor wells designed and constructed to be used in conjunction with existing monitor wells (approximately 113) to demonstrate the hydraulic effectiveness of the extraction wells.

-- Collection and transfer system for contaminated water to a VOC air stripping column system consisting of three (3) columns designed to treat a maximum of 2,000 gpm.

-- Treated water end use consisting of discharge at the TCAAP Sand and Gravel Pit for recharge into the Hillside aquifer.

-- Four (4) monitor wells designed and constructed to be used in conjunction with existing monitor wells (approximately 113) to monitor the geohydrologic response and groundwater quality due to discharge into the TCAAP Sand and Gravel Pit.

-- Provisions to modify the Phase I: BGRS to ensure capture of VOC contaminated groundwater in the Hillside and Prairie du Chien/Jordan Sandstone aquifers exceeding 5 ppb at the southwest boundary at TCAAP following startup and operation of the system. A period of 90 days is required in order to obtain data to assess hydraulic parameters to ensure hydraulic capture of contaminants at the south- west boundary and initiate modifications, as required. Current engineering estimates indicate over 90% of VOCs in groundwater at the southwest boundary of TCAAP will be removed by the Phase I: BGRS. The Phase I: BGRS will be operated continuously with modifications, as required, based upon assessment of operational data until the final remedial action is implemented.

DECLARATIONS:

Consistent with the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Contingency Plan (40 CFR Part 300), I have determined that the TCAAP GRP, Phase I: BGRS at TCAAP is a cost-effective interim remedy, which at a minimum, will be consistent with the final remedial action selected, following completion of the TCAAP RI/FS currently being conducted by the U.S. Army. It is anticipated that the final remedial action selected will provide adequate protection of public health, welfare, and the environment. The U.S. Environmental Protection Agency and the State of Minnesota have been consulted about the interim remedy and their comments considered in approving this interim response action. It has been determined that the treated effluent will meet all Federal and state promulgated legally applicable or relevant and appropriate requirements. The selected action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Department of Defense Environmental Restoration Account monies.

The U.S. Army is currently undertaking an RI/FS to evaluate the entire TCAAP site. A Record of Decision will be prepared for approval of the future remedial actions selected from the TCAAP RI/FS.

6/18/87
Date

Lewis D. Walker
L. D. WALKER
Deputy for Environment Safety and
Occupational Health
Office of the Assistant Secretary of the Army

INSTALLATION RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT

INTERIM RESPONSE DECISION RECORD

GROUNDWATER REMEDIATION PROGRAM
PHASE 1: BOUNDARY GROUNDWATER RECOVERY SYSTEM (BGRS)

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TABLES

INSTALLATION RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT (TCAAP)

Interim Response Decision Record
for the
Phase I: Boundary Groundwater Recovery System (BGRS)

I. DEFINITION OF CONTAMINATION PROBLEM AT THE PHASE I: BGRS SITE:

TCAAP is a 2,370-acre Government-owned, contractor-operated plant located in the northern Minneapolis/St. Paul, Minnesota, metropolitan area. It is surrounded by commercial, light industrial and residential property and is bounded by four communities. TCAAP has surface drainage to the Rice Creek Watershed and is underlain by a glacial outwash and sedimentary bedrock aquifer system.

TCAAP has been operated for the manufacture of artillery projectiles and small arms and associated munitions during World War II and the Korean and Vietnam Conflicts. In addition, portions of TCAAP have been leased for various manufacturing and storage operations. During the course of TCAAP operations, industrial wastes were generated and were treated and/or disposed onsite at various locations. The Initial Installation Assessment for Twin Cities Army Ammunition Plant, October 1978, Report No. 129, describes the past operational and disposal history for TCAAP.

In June 1981, volatile organic compounds (VOCs) were detected in the groundwater at and in the vicinity of TCAAP. Based on this finding, the Army initiated a two-phase remedial investigation to determine whether TCAAP was contributing to the regional groundwater contamination and to define the vertical and horizontal extent of contamination at TCAAP. The data from this investigation showed VOCs, primarily trichloroethylene (TRCLE), in the parts per million concentrations extending away from the sources. Of primary concern were the VOCs detected downgradient from the sources at greater than 40 parts per million (ppm) and the levels adjacent to the southwest boundary in excess of 7 ppm. The concern results from the groundwater flow direction from TCAAP toward the city of New Brighton. Site hydrology is provided in the Appendix. The Army took several actions following the two-phase remedial investigation:

- Initiation of a source assessment study for the potential significant sources at TCAAP.
- Initiation of a study to determine the impact of the bedrock valleys on groundwater and contaminant flow.
- Initiation of interim remedial activities at sources to reduce/eliminate infiltration to the groundwater.
- Initiation of a feasibility study (TCAAP Groundwater Remediation Action Alternatives Analysis--GRAAA) to evaluate remedial alternatives for contaminants migrating from TCAAP.

In addition, Honeywell (tenant at TCAAP) conducted remedial investigations, feasibility studies, and interim remedial actions at two additional potentially significant sources. A listing of related reports is provided at Table 3.

II. ANALYSIS OF PHASE I: BGRS AND REASONABLE ALTERNATIVES:

The TCAAP GRAAA considered response actions for mitigating groundwater contaminant migrating across the southwest boundary of TCAAP. The only two technically feasible options fall into two categories:

a. No action.

b. Groundwater extraction and treatment.

The TCAAP Groundwater Remediation Program (GRP), Phase I: BGRS, incorporates groundwater extraction and treatment in order to address contaminant migration at the southwest boundary of TCAAP. The TCAAP GRAAA considered various groundwater remediation systems to address contamination at the Plant. The TCAAP GRAAA consisted of three alternatives for interception and extraction, five alternatives for groundwater treatment, and seven alternatives for end use of the treated water. The IRP TCAAP GRPP, the conceptual document for the IRP TCAAP Groundwater Remediation Program (GRP) utilize the most effective, efficient and cost effective alternative for groundwater collection treatment end use at TCAAP. There presently exists no technologies other than groundwater extraction via wells to mitigate contaminant migration at TCAAP that are technically feasible. The TCAAP GRP has been phased in order to address the immediate need to stop contaminant migration at TCAAP. The total extent of contaminant migration has not been defined, and design of a total program is not possible at this time, nor is it cost effective. The "no action" alternative will allow the continued migration of contaminants, namely, VOCs in the Hillside and Prairie du Chien/Jordan Sandstone aquifer systems. This alternative would result in the continued migration of VOCs and affect areas downgradient of groundwater flow at TCAAP. Municipal wells owned by the city of New Brighton have been affected by VOC contamination originating from TCAAP. Alternative water supplies are currently available to provide potable water to the City in addition to residents located adjacent the southwest boundary of the Plant. Bottled water is currently being used by the Mengelkock & Gordon Rendering Plant.

The TCAAP GRP, Phase I: BGRS, is the first component of a contemplated three-phased program consisting of the following:

TCAAP Groundwater Remediation Program

Phase I: Boundary Groundwater Recovery System
Phase II: TCAAP Groundwater Recovery System
Phase III: Plume Groundwater Recovery System.

This Program is expected to address VOC groundwater contamination at the southwest boundary of TCAAP (Phase I: BGRS), the interior of TCAAP (Phase II:

TGRS), and the off-Plant plume, either in part and/or total (Phase III: PGRS). The Phase I: BGRS has been constructed and consists of the following components:

-- Six (6) Hillside Extraction Wells designed and constructed for a maximum pump rate of 200 gpm per well.

-- Nine (9) monitor wells designed and constructed to be used in conjunction with existing monitor wells (approximately 113) to demonstrate the hydraulic effectiveness of the extraction wells.

-- Collection and transfer system for contaminated water to a VOC air stripping column system consisting of three (3) columns designed to treat a maximum of 2,000 gpm.

-- Treated water end use consisting of primary discharge at the TCAAP Sand and Gravel Pit for recharge into the Hillside aquifer.

-- Four (4) monitor wells designed and constructed to be used in conjunction with existing monitor wells (approximately 113) to monitor the geohydrologic response and groundwater quality due to discharge into the TCAAP Sand and Gravel Pit.

-- Provisions to modify the Phase I: BGRS to ensure capture of VOC contaminated groundwater in the Hillside and Prairie du Chien/Jordan Sandstone aquifers at the southwest boundary at TCAAP following startup and operation of the system. A period of 90 days is required in order to obtain data to assess hydraulic parameters to ensure hydraulic capture of contaminants at the southwest boundary and initiate modifications, as required. The BGRS system as an interim response is expected to achieve a zone of capture to 5 parts per billion (ppb) TRCLE at the southwest boundary, which corresponds to the Maximum Contaminant Levels (MCLs) for TRCLE promulgated under the Safe Drinking Water Act. Preliminary engineering estimates indicate over 90% of VOCs in groundwater migrating past the southwest boundary of TCAAP will be removed by the Phase I: BGRS. The Phase I: BGRS will be operated until the final remedial action is implemented based upon the TCAAP RI/FS and Record of Decision.

Additional details of the TCAAP GRP, Phase I: BGRS, are provided in the following documents:

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Groundwater Remediation Program Plan (GRPP) June 1986

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Groundwater Remediation Program
Boundary Groundwater Recovery System
Contract Documents and Specifications August 1986

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Boundary Groundwater Recovery System (BGRS)
BGRS Extraction Well Pumping Test Report March 1987

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Boundary Groundwater Recovery System (BGRS)
Quality Assurance Project Plan (QAPP)
BGRS Monitoring Program March 1987

-- Installation Restoration Program
Twin Cities Army Ammunition Plant
Boundary Groundwater Recovery System (BGRS)
BGRS Monitoring Plan March 1987.

A listing of related reports is provided at Table 2.

III. IDENTIFICATION OF LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE (ARARs) REQUIREMENTS FOR THE PHASE I: BGRS.

The purpose of this section is to identify the Federal and promulgated Minnesota legal ARARs which should be applied to the effluents from the Phase I: BGRS pursuant to Section 121 of the Superfund Amendments and Reauthorization Act of 1986 (SARA).

The specific activity under consideration is the initiation and operation of the Phase I: BGRS at the southwest boundary of TCAAP as an interim operable unit response action to mitigate migration of hazardous substances across the boundary pending completion of the Remedial Investigation/Feasibility Study (RI/FS) and approval of a Record of Decision (ROD) for the final remedial action for TCAAP. At this time there are hazardous substances but no known pollutants or contaminants, as defined by SARA, crossing the boundary.

Establishment of water quality criteria to determine the necessary extent and degree of remediation for groundwater migrating off TCAAP is not part of this Interim ROD. Such determinations will be based on ARARs or a risk based number and will be included in the final RI/FS and ROD. This action is being taken to provide immediate protection to public health pending approval of the final Remedial Action for TCAAP. The U.S. Environmental Protection Agency and the Minnesota Pollution Control Agency have been contacted for input on ARARs for the Phase I: BGRS.

The initial step in selecting ARARs was to develop a list of Federal and promulgated Minnesota ARARs potentially relevant to the groundwater to be intercepted and treated by the Phase I: BGRS. The following factors were applied in selecting ARARs:

- o Any standard, requirement, criteria, or limitation under a Federal environmental law may be an ARAR. SARA 121(d)(2)(A)(i). Nonbinding advisories, goals, and guidelines are not ARARs.

- o Any promulgated standard, requirement, criteria, or limitation under a state environmental law that is more stringent than any Federal standard, of general applicability, enforceable by the state, and has been identified by the state to the Army in a timely manner.

- o A Maximum Contaminant Level Goal (MCLG) issued under the Safe Drinking Water Act (SDWA) may be considered a potential ARAR given the specific reference to them in SARA 121(d)(2)(A).

- o Only substantive requirements may be ARARs. Procedural requirements such as permits, notice and reporting requirements in Federal and state laws do not apply to CERCLA response actions.

Based on the application of the above factors, the following standards and regulations are applicable Federal and Minnesota ARARs:

FEDERAL ARARs :

1. National Primary Drinking Water Regulations at 40 CFR Parts 141 and 142, issued pursuant to the SDWA, particularly the promulgated and proposed MCLs and MCLGs issued as part of these regulations. These are listed at Table 1.

2. Standards issued pursuant to the Clean Water Act relating to water quality, particularly discharge limitations and ambient water quality criteria (AWQC). These are also listed at Table 1.

MINNESOTA STATE ARARs :

3. Minnesota Water Quality Standards, 6 Minnesota Code of Agency Rules, *Chapters 7050 and 7060.*

Discussion of ARARs Selected

Phase I: BGRS ARARs :

The Phase I: BGRS ARARs apply only to the operation of the treatment system. Treated effluent will be recharged to the Unit 3 Aquifer.

Aquifer Recharge :

Ambient groundwater quality standards have not been promulgated at the Federal or state level. Hence, there are no legally applicable standards, but there are relevant and appropriate standards for treated water discharged to the Arsenal Sand and Gravel Pit contained in the National Primary Drinking Water Regulations listed in Table 1.

Air Emmissions :

There are no known Federal or state ambient air quality standards which are legally applicable to the emission of VOCs from the Phase I: BGRS treatment system. The emissions from the Phase I: BGRS (facility) for VOCs in air are estimated to be below any known regulated levels. Therefore, there are no known air ARARs for the Phase I: BGRS.

IV. COMPLIANCE WITH IDENTIFIED ARARs.

Based on the above discussion and identification of ARARs, it is concluded that the proposed Phase I: BGRS, as an interim response action, will meet all ARARs. The capture zone resulting from the operation of the Phase I: BGRS is estimated to intercept TRCLE in the Hillside (approximately 100%) and Prairie du Chien/Jordan Sandstone (25-100%) aquifers to the 5 parts per billion level at the southwest boundary of TCAAP, corresponding to the MCL promulgated under the Safe Drinking Water Act. Modification of the Phase I: BGRS will occur, if required, to attain the 5 ppb capture level. The ten parts per billion level is an estimate of performance for the Phase I: BGRS and is in no way to be construed as an aquifer cleanup level for removing VOCs in place from groundwater for the entire plume emanating from TCAAP. The cleanup levels will be addressed in the TCAAP RI/FS currently being conducted by the U.S. Army. The final level of cleanup, anticipated to be the MCL of 5 ppb promulgated under the Safe Drinking Water Act, will be based upon the selection of the final remedy resulting from the TCAAP RI/FS and approval of the remedy by the U.S. Environmental Protection Agency administrator. The current estimate of performance for groundwater capture for TRCLE is within the range of the 10^{-5} and 10^{-6} risk levels defined under the "Ambient Water Quality Criteria."

V. PUBLIC PARTICIPATION AND INTERIM RECORD OF DECISION.

Attached hereto is a proposed Interim Record of Decision (IROD) on the Phase I: BGRS operable unit. Pursuant to SARA, Sections 113k, 120(f), 10 U.S.C. 2705 added by SARA Section 211, and Section 300.67 of the NCP, the public, local authorities, Region V of the U.S. Environmental Protection Agency, and the State of Minnesota were requested to comment on the Interim Response Decision Record and the proposed Record of Decision. The Army has responded to each significant comment, criticism, and new data submitted.

TABLE 1

Installation Restoration Program - Twin Cities Army Ammunition Plant
GROUNDWATER REMEDIATION PLAN
PHASE I: BOUNDARY GROUNDWATER RECOVERY SYSTEM
Proposed Federal Legally Applicable or Relevant and
Appropriate Standard, Requirement, criteria, or Limitation (ARAR)

Chemical Compound (2),(3),(4)	IRDMS Code	DRINKING WATER, ug/l MCLG	DRINKING WATER, ug/l MCL	AMBIENT WATER QUALITY CRITERIA, ug/l (1) (for protection of human health) TOXICITY ingesting organisms only	AMBIENT WATER QUALITY CRITERIA, ug/l (1) (for protection of human health) CARCINOGENICITY ingesting organisms only
purgeable organics					
BENZENE	C6H6	0 (7)	5 (6)		
CHLOROFORM	CHCL3		100 (5)		
CARBON TETRACHLORIDE	CCL4	0 (7)	5 (6)		
1,1-DICHLOROETHANE	11DCLE	None	None		
1,2-DICHLOROETHANE	12DCLE	0 (7)	5 (6)		
1,1-DICHLOROETHYLENE	11DCE	7 (7)	7 (6)		
1,2-DICHLOROETHYLENE	12DCE	70 (10)			
TETRACHLORETHYLENE	TCLEE				8
1,1,1-TRICHLOROETHANE	111TCE		200 (6)		
1,1,2-TRICHLOROETHANE	112TCE				6
TRICHLOROETHYLENE	TRCLE	0 (7)	5 (6)		
VINYL CHLORIDE	C2H3CL	0 (7)	1 (6)		
metals					
CHROMIUM	CR	120 (11)	50 (8)		
CADMIUM	CD		10 (8)		
LEAD	PB	20 (11)	50 (8)		
MERCURY	HG	3 (11)	2 (8)		
NICKEL	NI			134	
MANGANESE	MN		50 (9)		

(1) Based upon 10.E-05 Cancer Risk Level.
(2) Chemical compounds based upon the Installation Restoration Program, Twin Cities Army Ammunition Plant, Groundwater Remediation Program Plan, Table 2.3.

APPENDIX

SITE HYDROLOGY

The topography of Twin Cities Army Ammunition Plant (TCAAP) and occurrence (or absence) of underlying glacial till significantly contribute to the surficial hydrology at TCAAP. The Arsenal Sand, interpreted as a kame deposit similar to outwash, is both centrally located and forms the highest topography at TCAAP. This combination, coupled with a near surface apron of glacial till extending from the sides of the kame to all TCAAP boundaries, results in a duality of internal and radial drainage. Atop the kame, where the till is absent, most surficial flow infiltrates into the kame. However, surficial flow on the kame's lower elevations, where the till is present, follows a generally radial pattern away from the kame to adjacent drainage basins.

Surficial runoff within the eastern portion of TCAAP accumulates in Marsden Lake, which has its drainage to the north through a series of low swampy areas and ditches, intersecting Rice Creek approximately 3/4 of a mile north of TCAAP. Rice Creek, flowing to the southwest enters the northwest corner of TCAAP, flowing southerly and southwesterly until it exits TCAAP, about midway along the western plant boundary.

The surficial drainage in the northwestern portion of TCAAP drains into Rice Creek. Rice Creek then flows into Long Lake and eventually to the Mississippi River.

From about Building 576, westward along the southern TCAAP boundary and eastward from approximately Building 105 along the southwest boundary (southwestern TCAAP), drainage is diverted through ditches into a culvert system near perimeter Gate 4 where flow is directed to Round Lake. From Round Lake, the surficial flow goes into Valentine Lake, then, presumably into Long Lake and the Rice Creek Watershed. TCAAP is thereby, directly or indirectly, drained by Rice Creek.

Local drainage patterns are shown on Figure 1.

SITE SOILS

Surficial soils at Twin Cities Army Ammunition Plant are byproducts of the interplay between the most recent geologic deposition, weathering, and human activity. Figure 2 denotes the natural distribution of surficial geologic materials at TCAAP. The resultant modification of these materials into "soil" is depicted in Figure 6.

SITE GEOLOGY

TCAAP is located within a bedrock geologic feature known as the Twin Cities Basin (or Minneapolis Lowland). The area, like most of Minnesota, has been repeatedly glaciated, resulting in the removal of pre-existing overburden and some bedrock formations, the development of bedrock valleys, and the deposition of valley fill, outwash, and till. These materials are frequently overlain by

sediments from transitional and postglacial environments; e.g., fluvial, eolian, lacustrine, and swamp. Figure 2 denotes the occurrence and composition of the surficial deposits. Figures 3 and 4, respectively, describe the geologic columns for the Twin Cities basin and the TCAAP. Figure 5 outlines the TCAAP bedrock valleys.

SITE GROUNDWATER

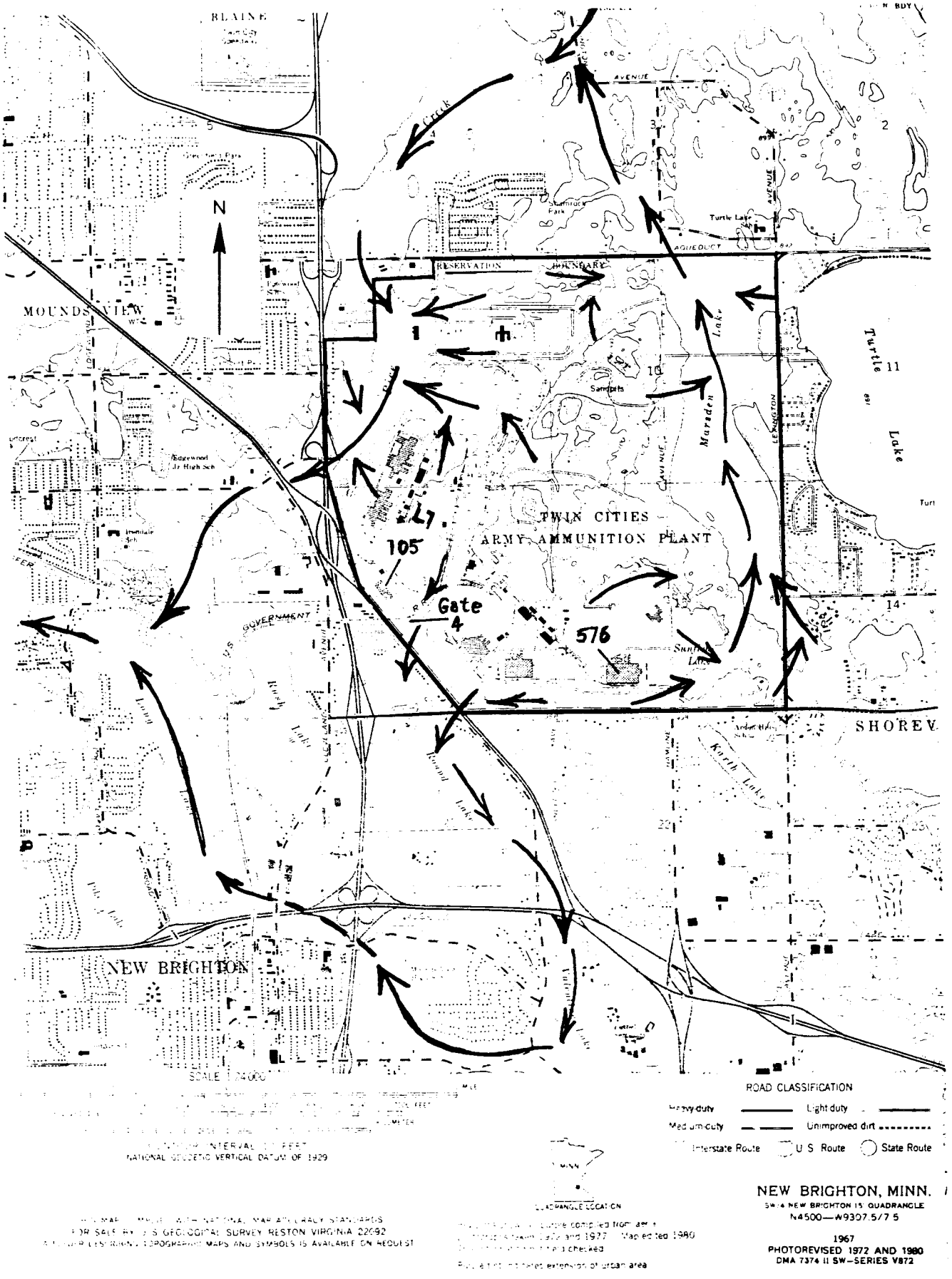
Three (3) major aquifer systems are recognized at TCAAP: the perched aquifer within Unit 1 above the glacial till, the Unit 3 Aquifer, and the Prairie du Chien-Jordan Aquifer within Unit 4. Deeper aquifers at TCAAP are present; e.g., the Mt. Simon-Hinckley Aquifer, but are not the subject of this discussion because of their isolation from contaminated aquifers.

The Unit 1 Aquifer is the shallowest of TCAAP aquifers and is unconfined. The water level contours of the Unit 1 Aquifer include surface water points, such as ponds, creeks, and ditches, which represent discharge of groundwater from Unit 1 to the surface (Figure 7). However, along the southern site boundary where clay-rich soils are found at ground surface, the surface water expression represents discontinuous, extremely localized, water conditions not related to any other Unit 1 groundwater conditions. This situation exists adjacent to Ryan Lake (also called Sunfish Lake) at the southeast corner of TCAAP, where the surface water of the lake is perched on the till and the Unit 1 Aquifer is discontinuous to the northeast, "downgradient" towards Marsden Lake. Other areas of the site, as where the clayey soils overlie the flanks of the kame deposit, results in localized perched water conditions. Pre-TCAAP aerial photography shows several isolated lakes south of the kame that have since been filled.

The Unit 3 Aquifer has been functionally subdivided into three (3) levels for study purposes: Upper, Middle, and Lower. Each of these subdivisions corresponds to about a third of the saturated thickness within Unit 3. This subdivision is thought to be less significant where Unit 3 thins (say, to less than 50 feet), thereby merging the aquifer's physio-chemical differences. The Unit 3 Aquifer is confined by Unit 2 along the western TCAAP boundary.

Within the Twin Cities Basin, the Prairie du Chien Group and Jordan Sandstone have been hydrologically combined into the Prairie du Chien-Jordan Aquifer. The same combination has been applied at TCAAP. However, there are hydraulic and geochemical differences within this aquifer which exist but are not readily understood. Borehole televising and aquifer analyses have indicated hydraulic and geochemical differences vertically within this aquifer. Evaluating these differences is made more complicated by the bedrock valleys which truncate the lateral continuity of the Prairie du Chien Group and Jordan Sandstone.

Potentiometric analyses of the Unit 3 and Prairie du Chien-Jordan Aquifers confirms the observed regional trends of the overburden (Unit 3) recharging the bedrock. Though subtleties exist, the overall flow pattern of these aquifers is essentially the same at TCAAP (Figures 8 to 11).

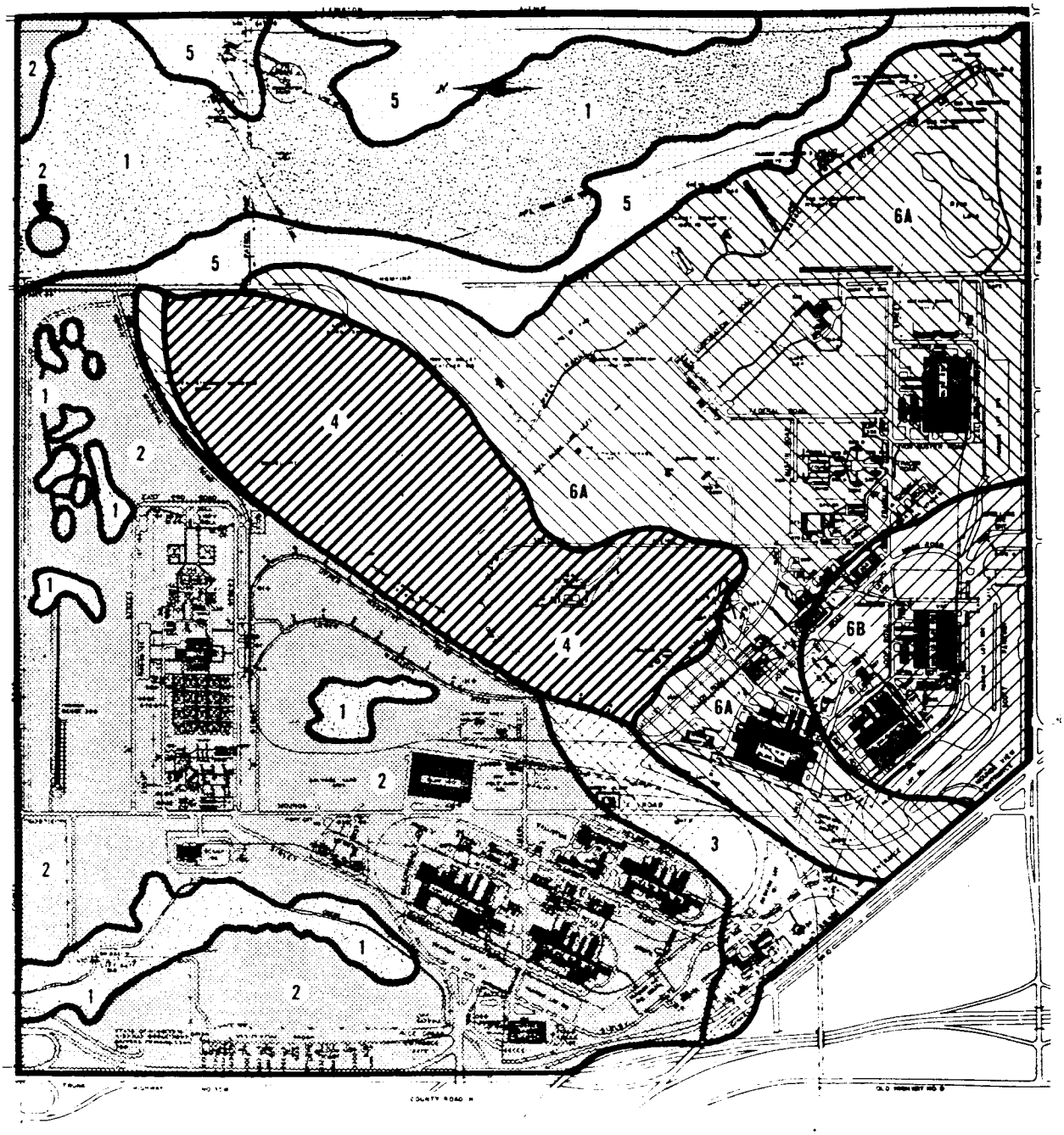


Source (base map):

USGS, 1980

TCAAP DRAINAGE

Figure 1



NOTE: Legend is on following page.

Source: USATHAMA, 1978

SURFICIAL GEOLOGY
TCAAP
Figure 2
Page 1 of 2

Swamp and Marsh Deposits

Organic fine sand, silt, and clay; peat and muck.

Fridley Formation

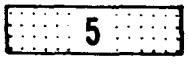
Laminated and cross-laminated fine to medium sand with some silt grading laterally and vertically into large bodies of silt. Most individual laminae are well sorted (poorly assorted). Mostly deposited in a lake. The upper 1.50 to 4.57 meters (5 to 15 feet) have been substantially modified by wind action and soil-forming processes. Unit includes sand dunes at surface.

New Brighton Formation

Laminated and cross-laminated fine to medium sand, silt, and coarse sand with pebbles. Variable both vertically and horizontally. Mostly deposited in a lake. Upper part modified by wind action and soil formation.

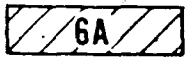
Arsenal Sand

Medium to coarse very gravelly sand; intricately cross-bedded. Kame deposited in reentrant in the ice by melt-water running off the ice.



Turtle Lake Sand

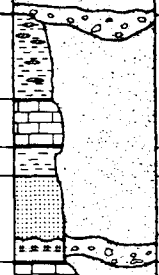
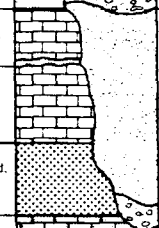
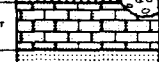
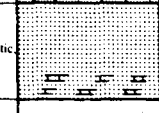
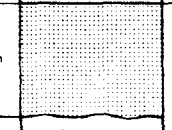
Laminated and cross-bedded fine to medium sand with some silt. Medium to coarse sand and gravel along western edge. Deposited in a lake.



Twin Cities Formation

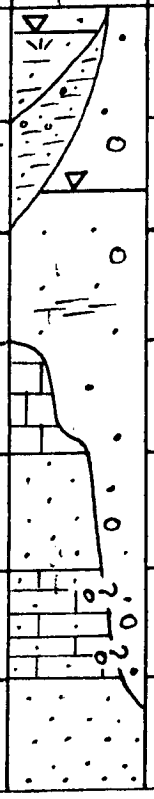
Till deposited by ice of the Grantsburg Sublobe with local pockets of sand and gravel. 6A, complex mixture of light gray till, reddish-brown till, and other related drifts. 6B, light gray till at surface, generally underlain by mixed light gray and reddish brown tills that are underlain in turn by reddish brown till.

SURFICIAL GEOLOGY
TCAAP (Legend)
Figure 2

System	Rock Unit	Approx. thickness (in feet)	General Description	Graphic Column	Water-Bearing Characteristics
Quaternary	Undifferentiated glacial deposits	0-500	Glacial till, outwash, and valley train sand and gravel; lake deposits, and alluvium of several ages and several provenances; vertical and horizontal distribution of units is complex		Distribution of aquifers and confining beds is poorly known; sand and gravel aquifers that yield moderate to large amounts of water are common in buried bedrock valleys
Ordovician	Decorah Shale	90	Shale, greenish-gray, fissile to blocky; includes thin discontinuous lenses of fossiliferous limestone that increase in abundance upward		Aquifer: Low yields from fractures in shale and solution cavities in dolostone
	Platteville Formation	to 35	Dolostone, light-gray to buff, thin- to med.-bedded, shaly		
	Glenwood Formation	to 5	Shale, greenish-gray, fissile, sandy		Confining bed
	St. Peter Sandstone	150	Sandstone, light-gray, massively bedded, well sorted, med.-gr., poorly cemented, quartzose; approx. 20-ft.-thick silty to shaly bed near base		Aquifer: moderate yields
					Confining bed
	Prairie du Chien Group: Shakopee Formation	50	Dolostone, buff, thin- to thick-bedded, silt- and sand-rich, med.-gr. thin sandstone beds near base		Aquifer: high yields from fractures in dolostone and from poorly cemented sandstone; principal aquifer of the Twin City basin
	Prairie du Chien Group: Oneota Dolomite	100	Dolostone, buff, thin- to thick-bedded, vuggy, med.-gr., silt-size dolomite matrix		
Cambrian	Jordan Sandstone	90	Sandstone, light-gray, massively bedded, med.- to coarse-gr., well sorted, poorly cemented, quartzose		
	St. Lawrence Formation	50	Dolostone, gray to tan, silty or sandy, argillaceous; glauconitic in upper part		Confining bed
	Franconia Formation	155	Sandstone, greenish-gray, thin-bedded, fine- to coarse-gr., silty to dolomitic, commonly glauconitic; an upper aquifer (Reno) is a fine-gr. sandstone		Aquifer: low yields
					Confining bed
	Ironton Sandstone	30	Sandstone, light-gray, poorly to well sorted, med.-gr., silt-rich, quartzose		Aquifer: moderate to high yields
	Galesville Sandstone	35	Sandstone, light-gray, well sorted, fine- to med.-gr., quartzose		
	Eau Claire Formation	to 130	Sandstone, red, fine- to med.-gr., silty, glauconitic; interbedded with grayish-green to red, fissile shale		Confining bed
	Mt. Simon Sandstone	160	Sandstone, light-gray, fine- to coarse-gr., quartzose; thin shale beds in upper part		Aquifer: moderate to high yields; second most important aquifer of Twin City basin
Keweenawan	Hinckley Sandstone	75	Sandstone, tan, med.- to coarse-gr., arkosic		
	Fond du Lac Formation and older sedimentary rocks	to 4,000	Sandstone and siltstone, fine-gr., well cemented, arkosic; interbedded with red to green micaceous shale		
	Metamorphic and Igneous Rocks	to 20,000	Mostly mafic lava flows with thin interflow sediments		Confining bed

Source: MGS, 1972

GEOLOGIC COLUMN
TWIN CITIES BASIN
Figure 3

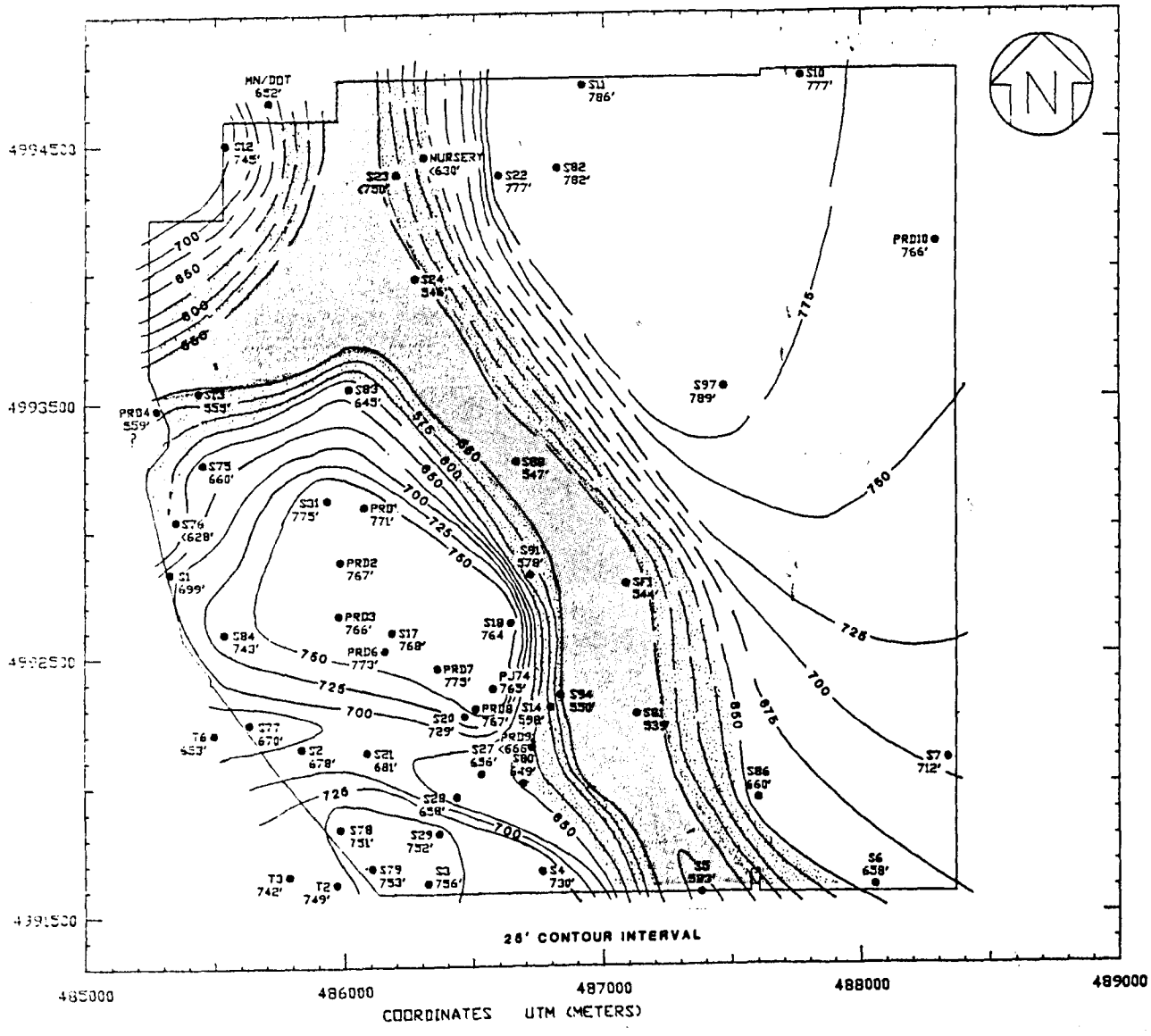
System	Rock Unit	Thickness (ft)	General Description	Graphic Column	Water-Bearing Characteristics	Gradient $i_{Horizontal}$	Hyd. Cond. K_H (ft/day)
Quaternary	Unit 1	0-80	Natural sediments and fill from ground surface to top of Unit 2.		Perched aquifer	0.01 (variable)	7×10^{-3} to 22
	Unit 2	0-130	Upper till in New Brighton area: Twin Cities Formation		Confining bed	Not measured	Not measured
	Unit 3	10-430	Sediments between base of Unit 2 and top of bedrock.		Aquifer (mostly unconfined)	0.0008-0.0020	< 10 to 283
Ordovician	Prairie du Chien Gp (Unit 4)[a]	0-120	Dolostone		Aquifer	0.0007-0.0020	15-1100
Cambrian	Jordan Sandstone	0-100	Sandstone		Aquifer		
	St. Lawrence Formation	0[b]-50[c]	Dolostone		Confining bed	Not measured	Not measured
	Franconia Formation	50[c]	Sandstone		Aquifer	Not measured	Not measured

NOTE: a - Unit 4 is defined as the bedrock (regardless of formation) in the TCAAP/New Brighton area.

b - Based on possible interpretation of data for TCAAP Production Well 4.

c - Values from "Geology of Minnesota: A Centennial Volume."

GEOLOGIC COLUMN
TCAAP
Figure 4



KEY:

- WELL NUMBER
- BEDROCK ELEVATION
- PRAIRIE DU CHIEN GROUP
- JORDAN SANDSTONE
- ST. LAWRENCE FORMATION

TCAAP
POINTS OF KNOWN
BEDROCK
ELEVATION

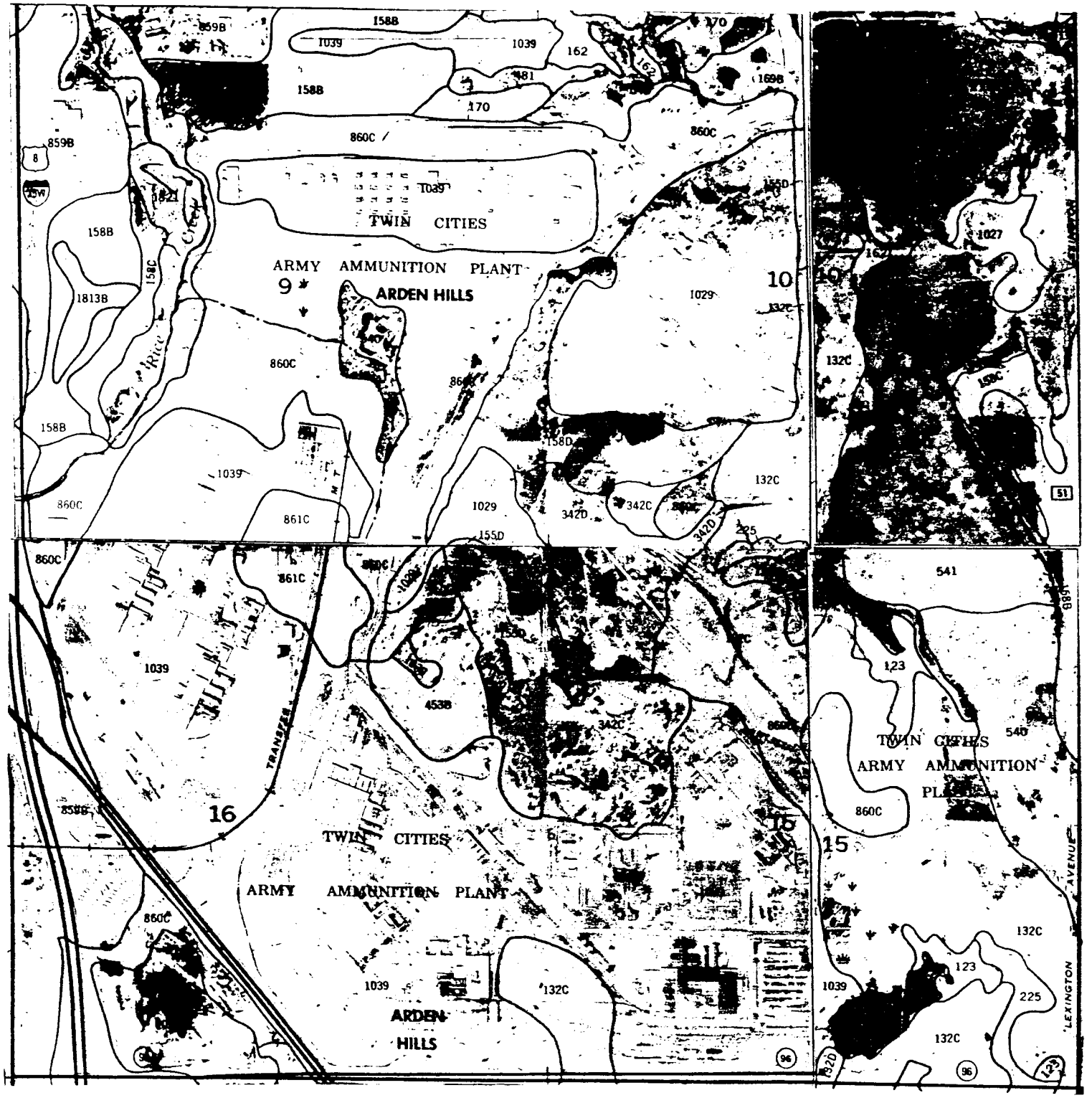
STS

January 31, 1986

FIGURE DF-11

Source: USATHAMA/STS, 1986

BEDROCK VALLEYS
TCAAP
Figure 5



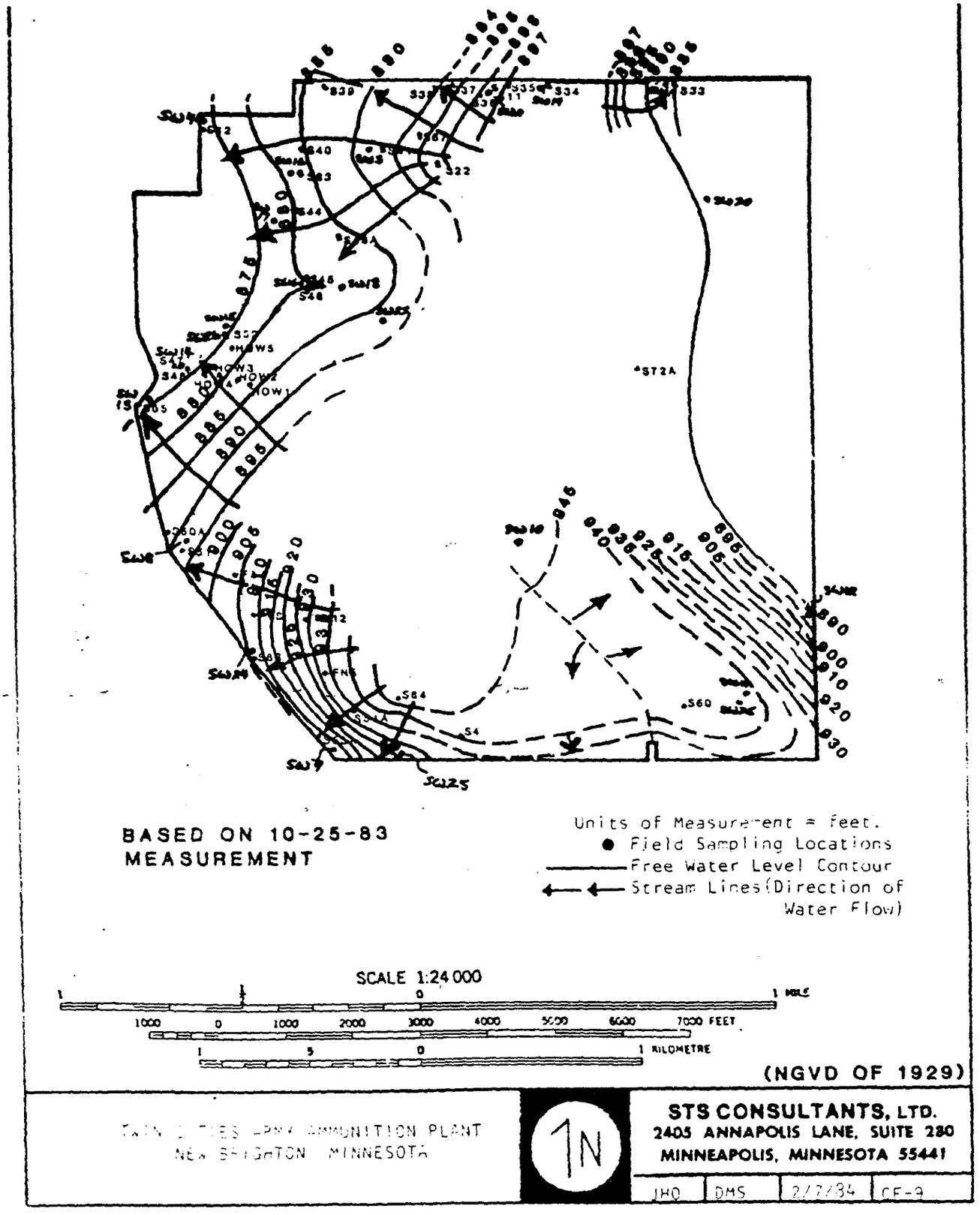
Source: USDA, 1980

N

SOILS OF TCAAP
Figure 6
Page 1 of 3

2—Ostrander silt loam, 0 to 2 percent slopes
2B—Ostrander silt loam, 2 to 6 percent slopes
2C—Ostrander silt loam, 6 to 12 percent slopes
7B—Hubbard loamy sand, 1 to 6 percent slopes
7C—Hubbard loamy sand, 6 to 12 percent slopes
7D—Hubbard loamy sand, 12 to 18 percent slopes
8—Sparta loamy sand, 0 to 2 percent slopes
8B—Sparta loamy sand, 2 to 6 percent slopes
8C—Sparta loamy sand, 6 to 15 percent slopes
12C—Emmert loamy coarse sand, 3 to 15 percent slopes
12D—Emmert gravelly loamy coarse sand, 15 to 25 percent slopes
49—Antigo silt loam, 0 to 2 percent slopes
49B—Antigo silt loam, 2 to 6 percent slopes
49C—Antigo silt loam, 6 to 12 percent slopes
49D—Antigo silt loam, 12 to 18 percent slopes
75—Bluffton loam
100B—Copaston loam, 0 to 6 percent slopes
100C—Copaston loam, 6 to 12 percent slopes
113—Webster loam
120—Brill silt loam
123—Dundas fine sandy loam
132B—Hayden fine sandy loam, 2 to 6 percent slopes
132C—Hayden fine sandy loam, 6 to 12 percent slopes
132D—Hayden fine sandy loam, 12 to 25 percent slopes
151—Burkhardt sandy loam, 0 to 3 percent slopes
151B—Burkhardt sandy loam, 3 to 9 percent slopes.
153B—Santiago silt loam, 2 to 6 percent slopes
153C—Santiago silt loam, 6 to 15 percent slopes
155B—Chetek sandy loam, 0 to 6 percent slopes
155C—Chetek sandy loam, 6 to 12 percent slopes
155D—Chetek sandy loam, 12 to 25 percent slopes.
158B—Zimmerman loamy fine sand, 0 to 6 percent slopes
158C—Zimmerman loamy fine sand, 6 to 12 percent slopes
158D—Zimmerman loamy fine sand, 12 to 25 percent slopes
159—Anoka loamy fine sand, 0 to 3 percent slopes
159B—Anoka loamy fine sand, 3 to 9 percent slopes
161—Isanti loamy fine sand
162—Lino loamy fine sand
166—Ronneby fine sandy loam
169B—Braham loamy fine sand, 1 to 6 percent slopes
169C—Braham loamy fine sand, 6 to 15 percent slopes
170—Blomford loamy fine sand
174C—Gale silt loam, 6 to 15 percent slopes
174F—Gale silt loam, 25 to 50 percent slopes
177B—Gotham loamy sand, 1 to 6 percent slopes
177C—Gotham loamy sand, 6 to 12 percent slopes
177D—Gotham loamy sand, 12 to 20 percent slopes
189—Auburndale silt loam
225—Nessel fine sandy loam, 1 to 4 percent slopes.
259B—Grays silt loam, 2 to 6 percent slopes
264—Freeon silt loam, 1 to 4 percent slopes
265—Soderville loamy fine sand
266—Freer silt loam
298—Richwood silt loam, 0 to 2 percent slopes
298B—Richwood silt loam, 2 to 6 percent slopes
301B—Lindstrom silt loam, 2 to 4 percent slopes
302B—Rosholt sandy loam, 1 to 6 percent slopes
302C—Rosholt sandy loam, 6 to 15 percent slopes
325—Prebish loam
327—Dickman sandy loam, 0 to 2 percent slopes
327B—Dickman sandy loam, 2 to 6 percent slopes
327C—Dickman sandy loam, 6 to 12 percent slopes
329—Chaska silt loam
340B—Whalan silt loam, 1 to 6 percent slopes
340C—Whalan silt loam, 6 to 12 percent slopes
342B—Kingsley sandy loam, 2 to 6 percent slopes
342C—Kingsley sandy loam, 6 to 12 percent slopes.
342D—Kingsley sandy loam, 12 to 18 percent slopes
342E—Kingsley sandy loam, 18 to 30 percent slopes
367B—Campia silt loam, 0 to 8 percent slopes
408—Faxon silt loam
411—Waukegan silt loam, 0 to 2 percent slopes
411B—Waukegan silt loam, 2 to 6 percent slopes
411C—Waukegan silt loam, 6 to 12 percent slopes
449—Crystal Lake silt loam, 1 to 3 percent slopes
452—Comstock silt loam
453B—Demontreville loamy fine sand, 2 to 6 percent slopes
453C—Demontreville loamy fine sand, 6 to 12 percent slopes
453D—Demontreville loamy fine sand, 12 to 25 percent slopes
454B—Mahtomedi loamy sand, 0 to 6 percent slopes
454C—Mahtomedi loamy sand, 6 to 12 percent slopes
454D—Mahtomedi loamy sand, 12 to 25 percent slopes
454F—Mahtomedi loamy sand, 25 to 40 percent slopes
456—Barronett silt loam
460B—Baytown silt loam, 1 to 6 percent slopes

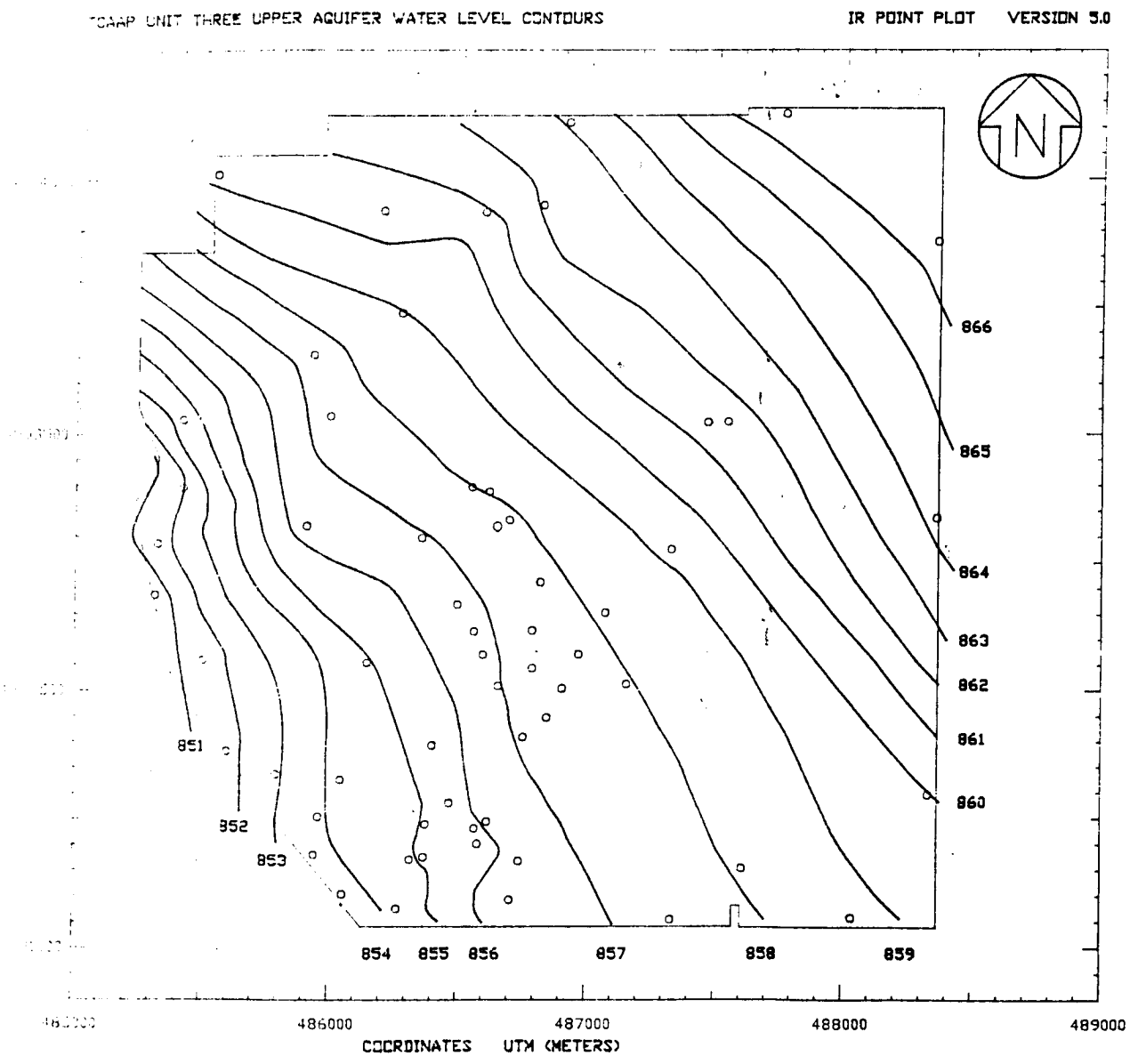
460C—Baytown silt loam, 6 to 12 percent slopes
468—Otter silt loam
472B—Channahon silt loam, 1 to 6 percent slopes
472C—Channahon silt loam, 6 to 12 percent slopes
472D—Channahon silt loam, 12 to 18 percent slopes
481—Kratka fine sandy loam
488F—Brodale flaggy loam, 20 to 50 percent slopes
504B—Duluth silt loam, 1 to 6 percent slopes
504C—Duluth silt loam, 6 to 12 percent slopes
504D—Duluth silt loam, 12 to 25 percent slopes
507—Poskin silt loam
529—Ripon silt loam, 1 to 2 percent slopes
529B—Ripon silt loam, 2 to 6 percent slopes
529C—Ripon silt loam, 6 to 12 percent slopes
540—Seelyeville muck
541—Rifle muck
543—Markey muck
544—Cathro muck
552—Kerston muck
852B—Urban land-Copaston complex, 0 to 8 percent slopes
857—Urban land-Waukegan complex, 0 to 3 percent slopes
857C—Urban land-Waukegan complex, 3 to 15 percent slopes
858—Urban land-Chetek complex, 0 to 3 percent slopes
858C—Urban land-Chetek complex, 3 to 15 percent slopes
859B—Urban land-Zimmerman complex, 1 to 8 percent slopes
860C—Urban land-Hayden-Kingsley complex, 3 to 15 percent slopes
860D—Urban land-Hayden-Kingsley complex, 15 to 25 percent slopes
861C—Urban land-Kingsley complex, 3 to 15 percent slopes
861D—Urban land-Kingsley complex, 15 to 25 percent slopes
862—Urban land-Dundas complex, 1 to 4 percent slopes
863—Urban land-Lino complex, 0 to 3 percent slopes
896C—Mahtomedi-Kingsley complex, 3 to 12 percent slopes
896D—Mahtomedi-Kingsley complex, 12 to 25 percent slopes
896F—Mahtomedi-Kingsley complex, 25 to 40 percent slopes
1013—Pits, quarry
1027—Udorthents, wet substratum
1029—Pits, gravel
1033—Udifluvents
1039—Urban land
1040—Udorthents
1055—Aquolls and Histosols, ponded
1813B—Lino Variant loamy fine sand, 2 to 6 percent slopes
1819F—Dorerton-Rock outcrop complex, 25 to 65 percent slopes
1820F—Mahtomedi Variant-Rock outcrop complex, 25 to 60 percent slopes
1821—Algansee loamy sand
1827—Waukegan Variant silt loam, 0 to 2 percent slopes
1827B—Waukegan Variant silt loam, 2 to 9 percent slopes
1847—Barronett silt loam, sandy substratum
1848B—Sparta loamy sand, bedrock substratum, 0 to 6 percent slopes



NOTE: Contours and flow directions may not be as continuous as shown.

Source: USATHAMA/STS, 1984

POTENTIOMETRIC SURFACE(S)
UNIT 1
TCAAP
Figure 7



o WATER LEVEL MEASUREMENT POINT

BASED ON WATER LEVEL MEASUREMENTS OF 11-13-1985

TCAAP
UNIT THREE
UPPER AQUIFER
WATER LEVEL
CONTOURS

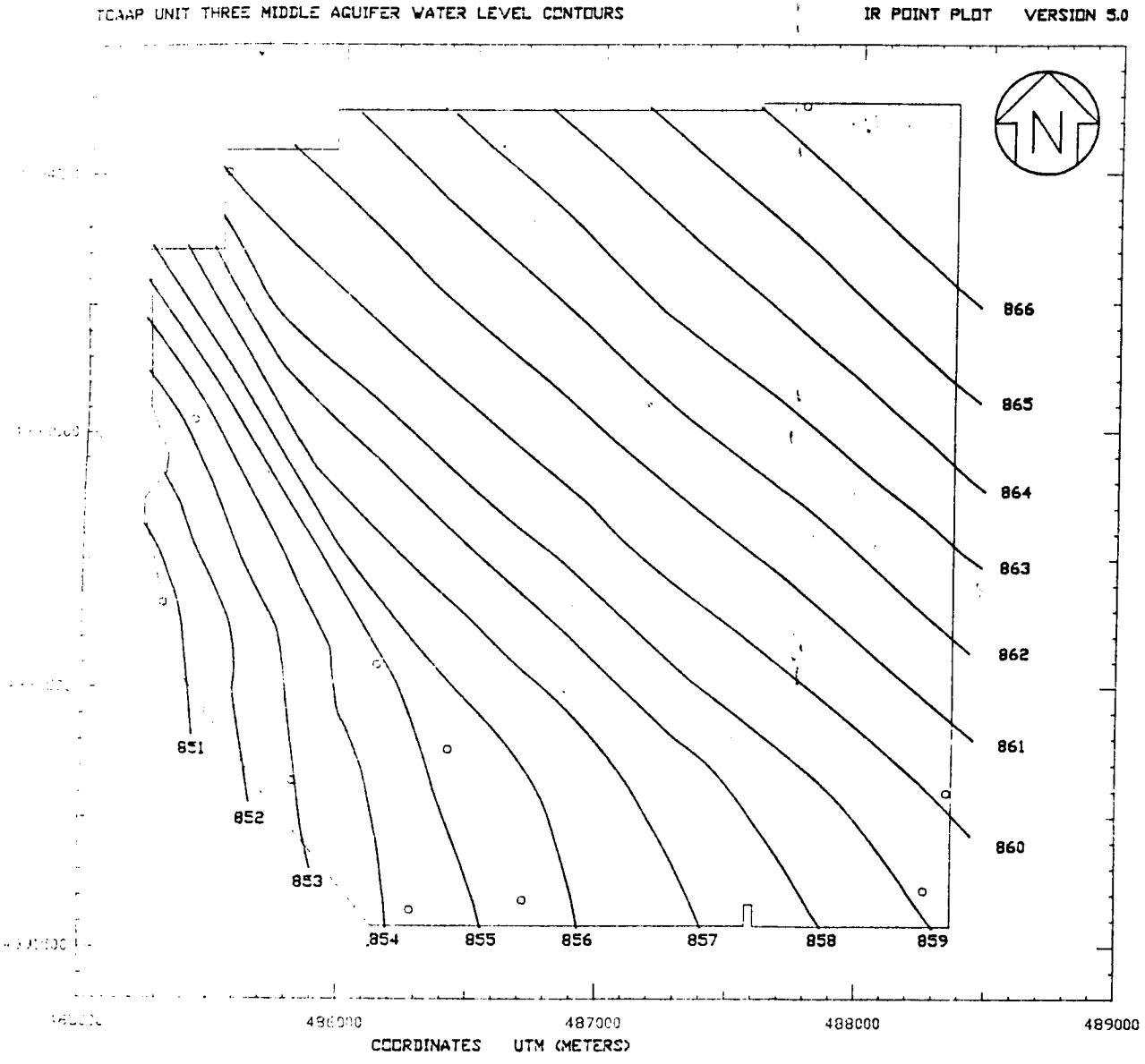
STS

January 31, 1986

FIGURE DF-19

Source: USATHAMA/STS, 1986

POTENTIOMETRIC SURFACE
UNIT 3 (Upper)
TCAAP
Figure 8



o WATER LEVEL MEASUREMENT POINT

BASED ON WATER LEVEL MEASUREMENTS OF 11-13-1985

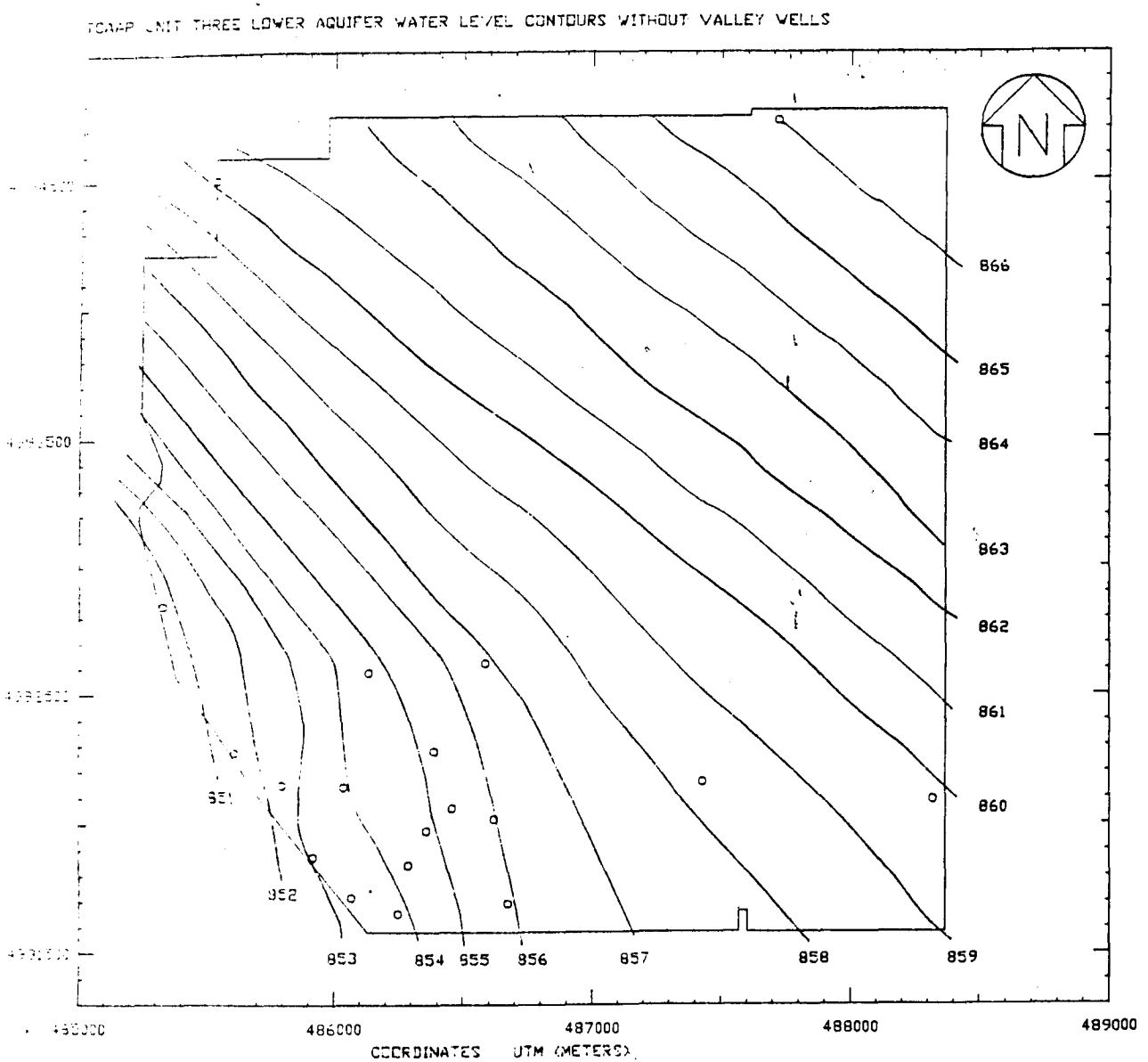
TCAAP
UNIT THREE
MIDDLE AQUIFER
WATER LEVEL
CONTOURS

STS | JANUARY 31 1986

FIGURE DF-20

Source: USATHAMA/STS, 1986

POTENTIOMETRIC SURFACE
UNIT 3 (Middle)
TCAAP
Figure 9



o WATER LEVEL MEASUREMENT POINT

BASED ON WATER LEVEL MEASUREMENTS OF 11-13-1985

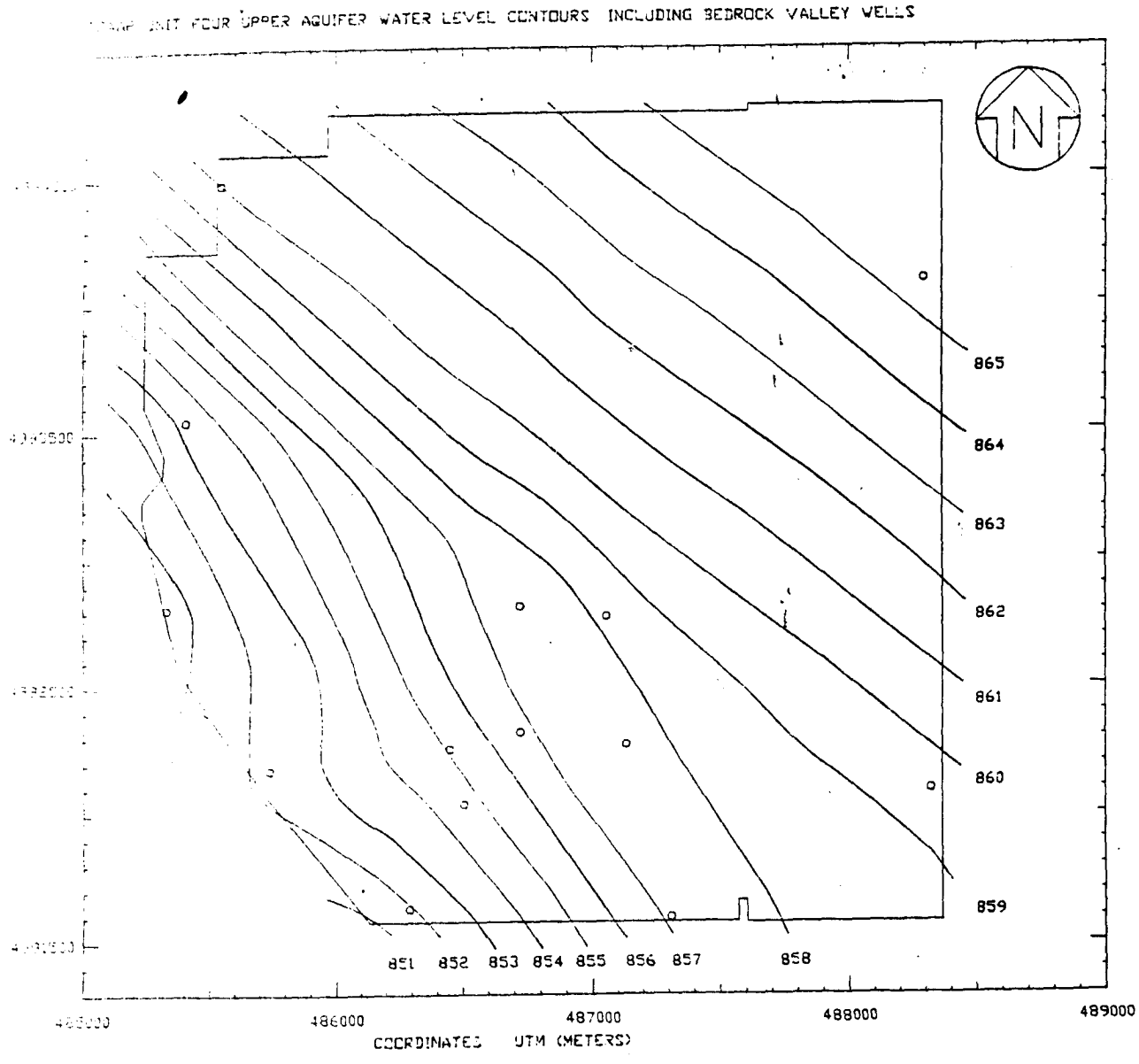
TCAAP
UNIT 3 LOWER AQUIFER WATER LEVEL CONTOURS WITHOUT VALLEY WELLS

STS | January 31, 1986

FIGURE DF-21A

Source: USATHAMA/STS, 1986

POTENTIOMETRIC SURFACE
UNIT 3 (Lower)
TCAAP
Figure 10



o WATER LEVEL MEASUREMENT POINT

BASED ON WATER LEVEL MEASUREMENTS OF 11-13-1985

TCAAP
UNIT 4 UPPER AQUIFER WATER LEVEL CONTOURS INCLUDING BEDROCK VALLEY WELLS

STS | January 31, 1986

FIGURE DF-22A

Source: USATHAMA/STS, 1986

POTENTIOMETRIC SURFACE
UNIT 4 (Prairie du Chien)
Figure 11

REFERENCES

1. USATHAMA/STS, Twin Cities Army Ammunition Plant Environmental Contamination Survey, Phase 1 Report, Volume II, Geotechnical Report, 1983.

2. U.S. Geological Survey, New Brighton Quadrangle, 7.5 Minute Series (Topographic), Photorevised 1980.

3. USATHAMA, Installation Assessment of Twin Cities Army Ammunition Plant, Report No. 129, 1978.

4. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washington and Ramsey Counties, Minnesota, 1980.

5. USATHAMA/STS, Twin Cities Army Ammunition Plant, Environmental Contamination Survey, Phase 1 Report, Volume I, Contamination Report, 1983.

6. Minnesota Geological Survey, Geology of Minnesota: A Centennial Volume, 1972.

7. USATHAMA/STS, Twin Cities Army Ammunition Plant Environmental Contamination Survey (Phase II), Volume II, Geotechnical Report, 1984.

8. Honeywell/CRA, Groundwater Remediation Program Plan (GRPP), 1986.

9. USATHAMA/STS, Twin Cities Army Ammunition Plant Bedrock Valley/Monitor Well Installation Survey, Volume II, Geotechnical Report, 1986.

REFERENCES

1. USATHAMA/STS, Twin Cities Army Ammunition Plant Environmental Contamination Survey, Phase 1 Report, Volume II, Geotechnical Report, 1983.

2. U.S. Geological Survey, New Brighton Quadrangle, 7.5 Minute Series (Topographic), Photorevised 1980.

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4. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washington and Ramsey Counties, Minnesota, 1980.

5. USATHAMA/STS, Twin Cities Army Ammunition Plant, Environmental Contamination Survey, Phase 1 Report, Volume I, Contamination Report, 1983.

6. Minnesota Geological Survey, Geology of Minnesota: A Centennial Volume, 1972.

7. USATHAMA/STS, Twin Cities Army Ammunition Plant Environmental Contamination Survey (Phase II), Volume II, Geotechnical Report, 1984.

8. Honeywell/CRA, Groundwater Remediation Program Plan (GRPP), 1986.

9. USATHAMA/STS, Twin Cities Army Ammunition Plant Bedrock Valley/Monitor Well Installation Survey, Volume II, Geotechnical Report, 1986.

INSTALLATION RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT

RECORD OF DECISION ON OPERABLE UNIT

-

GROUNDWATER REMEDIATION PROGRAM

PHASE I: Boundary Groundwater Recovery System (BGRS)

RESPONSE TO COMMENTS
RECEIVED DURING THE PUBLIC
COMMENT PERIOD: 10 MAY - 01 JUNE 1987

DEFINITIONS

AMC	U.S. Army Materiel Command
ARARs	Applicable or relevant and appropriate requirements
BACT	Best Available Control Technology
BGRS	Boundary Groundwater Recovery System
CBE	Citizens for a Better Environment
CDM	Camp Dresser and McKee
CERCLA	Comprehensive Environmental Response Compensation and Liability Act of 1980
DA	Department of the Army
DNR	Minnesota Department of Natural Resources
DROD	Draft Record of Decision
EPA	U.S. Environmental Protection Agency
FCC	Federal Cartridge Corporation
GAC	Granular Activated Carbon
GRAAA	Groundwater Remedial Action Alterntives Analysis
GRP	Groundwater Remediation Program
GRPP	Groundwater Remediation Program Plan
IRDR	Interim Response Decision Record
IRP	Installation Restoration Program
ISV	In-situ volatilization
MCL	Maximum Contaminant Levels
MCLGs	Maximum Contaminant Level Goals
MDH	Minnesota Department Health
MPCA	Minnesota Pollution Control Agency
MWCC	Minnesota Waste Control Commission
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPDES/SDS	National Pollutant Discharge Elimination System/State Disposal System
PA	Preliminary Assessment
PGRS	Plume Groundwater Recovery System
ppb	Parts per billion
ppm	Parts per million

DEFINITIONS (Cont)

RAP	Remedial Action Plan
RI/FS	Remedial investigation/feasibility study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
TCAAP	Twin Cities Army Ammunition Plant
TCE	Trichloroethylene (mainly noted as TRCLE)
TLM	Median tolerance limit
TGRS	Twin Cities Army Ammunition Plant (TCAAP) Groundwater Recovery System
TRC	Technical Review Committee
TRCLE	Trichloroethylene
VOCs	Volatile Organic Compounds

LIST OF EXHIBITS

EXHIBIT A: Letter, U.S. Environmental Protection Agency, Region 5, 230 Southborn Street, Chicago, Illinois 60604, 1 June 1987

EXHIBIT B: Letter, Minnesota Pollution Control Agency, 520 LaFayette Road, St. Paul, Minnesota 55155, 1 June 1987

EXHIBIT C: Letter, Briggs and Morgan Law Offices Professional Association, 220 First National Bank Building, St. Paul, Minnesota 55101, 1 June 1987

EXHIBIT D: Letter, Saint Anthony Village, Administrative Offices, 3301 Silver Lake Road, St. Anthony, Minnesota 55418, 28 May 1987

EXHIBIT E: Letter, LeFevere, Lefler, Kennedy, O'Brien and Drawz, 2060 First Bank Place West, Minneapolis, Minnesota 55402, 1 June 1987

EXHIBIT F: Letter, Bruce A. Liesch Associates, Inc., 3131 Fernbrook Lane, Minneapolis, Minnesota 55441, 27 May 1987

EXHIBIT G: Letter, Citizens For A Better Environment, 1515 E. Lake Street, Minneapolis, Minnesota 55407, 1 June 1987

EXHIBIT H: Letter, Minnesota Department of Natural Resources, 500 LaFayette Road, St. Paul, Minnesota 55155, 1 June 1987

EXHIBIT I: Verbal Questions/Statements from the Public Hearing, 21 May 1987

EXHIBIT J: Letter, Preserve Our Land, P. O. Box 456, Little Falls, Minnesota 56345, 29 April 1987

EXHIBIT K: Letter, Metropolitan Waste Control Commission, 350 Metro Square Building, St. Paul, Minnesota 55101, 28 May 1987

EXHIBIT L: Letter, Minnesota Department of Health, 717 S.E. Delaware Street, P. O. Box 9441, Minneapolis, Minnesota 55440, 29 May 1987

EXHIBIT A

LETTER

U.S. Environmental Protection Agency, Region 5
230 South Dearborn Street
Chicago, Illinois 60604

01 June 1987

EXHIBIT A: Letter, U.S. Environmental Protection Agency, Region 5, 230 South Dearborn Street, Chicago, Illinois 60604, 1 June 1987

COMMENT NO. 1:

Any system or device built to treat a release (or threat of release or further release) under CERCLA/SARA should be built to attain an identified level of protection of public health, welfare and the environment. It is customary to designate the level of protection as a design specification prior to design and construction of a remedial alternative. The Draft Record of Decision (DROD) does have goals for discharge concentrations of contaminants and states an expected capture zone of all water in both the Prairie du Chien/Jordan and the Hillside Sand Aquifers with contaminant concentrations of 10 ug/1. (Page 6 of DROD). The DROD should include a capture performance criteria and should require automatic modification of the proposed remedial action operable unit alternative in the event such criteria are not achieved.

RESPONSE NO. 1:

Groundwater capture by the Boundary Groundwater Recovery System (BGRS) for trichloroethylene (TRCLE) of 10 ug/1, as stated in the Record of Decision (ROD), is the best engineering estimate of performance by the system at this time given the data available to date. However, the U.S. Army will adopt the TRCLE MCL of 5 ppb as the appropriate BGRS capture criteria. Modification to the BGRS will occur, if required, following the 90-day operational period. This operational period will allow for system evaluation and provide data for system revision in order to obtain the desired capture level for the unconsolidated/bedrock aquifers.

COMMENT NO. 2:

The U.S. Environmental Protection Agency (EPA) believes that the Maximum Contaminant Levels (MCLs) are not necessarily the appropriate level for capture performance criteria because of the many substances found in the groundwater, but rather a health risk based set of criteria is most appropriate. We feel that the values based on a health risk of 10^{-6}, is most appropriate because of the complexity of attempting to anticipate the interaction between the different hazardous substances present at Twin Cities Army Ammunition Plant (TCAAP) and the lack of an Endangerment Assessment to use as a basis for any other level of protection.

RESPONSE NO. 2:

The extent of groundwater capture for the BGRS has been addressed in the response to EXHIBIT A.1. The U.S. Army will adopt the TRCLE MCL of 5 ppb, which is the standard for drinking water supply systems, as an appropriate BGRS capture zone. The final level of cleanup will be based upon the selection resulting from the (TCAAP) remedial investigation/ feasibility study (RI/FS) which will evaluate all the factors required to address the level of groundwater remediation.

COMMENT NO. 3:

The TCAAP Groundwater Remedial Action Alternatives Analysis (GRAAA) specifies criteria in Chapter 3. The criteria specify engineering criteria rather than criteria for the protection of human health, welfare and the environment. Page 3-3 of the GRAAA states that "It appears that the EPA's position is that a risk analysis or endangerment assessment for receptors and potential receptors will be required to establish clean-up levels". This indeed is EPAs position for final cleanup levels. The prior comments address the appropriate cleanup level for remedial actions where there are a variety of substances present in the groundwater. The EPA believes that reducing the contaminant migration off TCAAP in the two aquifers to the 10^{-6} risk level for each substance (2.7 ppb for TRCLE) is appropriate in this case to adequately protect human health, welfare and the environment. The EPA believes this degree of protection must be achieved by the selected remedial action operable unit alternative, not by the final remedy selected for the TCAAP facility. Any operable unit proposed by the U.S. Army should be modified if this degree of protection cannot be achieved by the proposed design.

RESPONSE NO. 3:

Aquifer restoration down to the suggested 10^{-6} risk level has not successfully been demonstrated to our knowledge and may or may not be possible. The effectiveness of the BGRS technology will be evaluated during the 90-day test period against the U.S. Army adopted capture zone criteria of 5 ppb, the TRCLE MCL established for public water supply systems. Final cleanup levels will be determined through the RI/FS process currently being conducted by the U.S. Army.

COMMENT NO. 4:

The GRAAA states on page 5-4 that data "...implies that screening (withdrawal) of most of the saturated zone may be required to provide effective interception of groundwater". The proposed BGRS described in the DROD does not describe in any wells in the Unit 4 (Prairie du Chien/Jordan) aquifer.

RESPONSE NO. 4:

The TCAAP GRAAA provides for the conceptual evaluation of alternatives used to select the interim response action. The TCAAP GRPP provided the basis for the Phase I: BGRS design. Actual performance of the system will be determined during the 90-day trial period and modifications will be implemented, if required, to obtain the 5 ppb groundwater capture of TRCLE. Although the Phase I: BGRS has no Unit 4 wells planned, modifications to the system based on evaluation of the 90-day trial may include Unit 4 extraction wells. See response, Exhibit F.3.

COMMENT NO. 5:

The GRAAA states on page 5-5 that thirteen (13) interception well locations (spaced about 300 feet apart) would be required in both Unit 3 and Unit 4 aquifers (a total of twenty-six (26) wells) at a pumping rate totaling 910-1000 gpm (Scenarios I, II, VI). The proposed BGRS described in the DROD consists of

six (6) pumping wells spaced 300 feet apart, each pumping at 200 gpm (at total of 1200 gpm). This seems significantly different than the closest alternatives in the GRAAA (Scenarios I, II, VI summarized in Table 5-1 of the GRAAA). An explanation of the reasons for proposing an alternative not previously considered is needed.

RESPONSE NO 5:

The present Phase I: BGRS does consist of six (6) extraction wells. Following the 90-day trial period, modifications, if required, will be implemented following evaluation of data collected under the TCAAP Groundwater Remediation Plan (GRP) BGRS Monitoring Plan. Additional wells, if required, will be installed to maintain the required groundwater capture zone. Additional response is provided in Exhibit A.4.

COMMENT NO. 6:

Page 7-1 of Chapter 7 of the GRAAA states that "Discharge to potable water supply systems or reinjection to the groundwater should at least meet the 10^{-6} risk level (for study purposes)." The EPA agrees that 10^{-6} risk level is appropriate, yet the BGRS proposed in the DROD does not expect to meet this level of capture (see our comments 1, 2, and 3). Hence, the proposed BGRS is expected to allow water to continue to migrate off TCAAP that does not meet this health criteria. The proposed BGRS should be modified to ensure adequate health protection at the 10^{-6} risk level for individual substances, rather than to wait for final remedies several years in the future.

RESPONSE NO. 6:

See response, Exhibit A.3.

COMMENT NO. 7:

Mr. Jaska of Honeywell Inc. has stated several times that the estimated capture of volatile organic compounds (VOCs) by the proposed BGRS in Unit 3 (Hillside Sand) will be 100 percent (see for example Mr. Jaska's letters to Mr. Day dated April 27, 1987, and to Mr. Kalitowski dated May 1, 1982). This assertion of 100 percent capture is different than the specification given by the Army in the DROD published on May 10, 1987. The inconsistency between Honeywell and Army expectations with respect to the proposed BGRS highlight the need for clearly delineated performance criteria for the operable unit.

RESPONSE NO. 7:

The BGRS is expected to perform as stated within the "Draft Record of Decision on Operable Unit" submitted for public comments. The degree (percentage) of capture referenced within the comment pertains to the capture zone defined by the 10 ppb concentration of TRCLE in groundwater at the southwest boundary of TCAAP. The BGRS is expected to capture over 90% of (VOCs) in the unconsolidated/bedrock regional aquifer crossing the boundary. After the 90-day trial period evaluation, the system may be modified to achieve the U.S. Army adopted capture zone of 5 ppb. See response, Exhibit A.3.

COMMENT NO. 8:

The proposed BGRS described in the U.S. Army DROD has a capture "front" of approximately 3000 feet. The GRAAA indicates the closest alternative as having a 6000 - 7000 foot "front" (see figure 5-1 of the GRAAA). The reasons for proposing a linear capture area significantly smaller than any alternative considered were not explained in the DROD. An explanation of the criteria or rationale used to propose this smaller capture area should be described for public comment.

RESPONSE NO. 8:

See response, Exhibit A.4. and Exhibit A.3.

COMMENT NO. 9:

The list of substances on tables 1 and 2 of the DROD is not inclusive to protect human health and the environment. Examples of analytical parameters which should be monitored are radiation, zinc and barium. A suggested list of substances which should be reviewed has been previously provided to the U.S. Army and may also be found in the National Pollutant Discharge Elimination System (NPDES) permit. The remedial action implemented for this operable unit will have to include a monitoring plan that ensures generation of data to fully evaluate the effectiveness (including degree of contaminant interception) and impacts of the selected alternative and to monitor the discharge of hazardous substances, contaminants and pollutants from the operable unit.

RESPONSE NO. 9:

The TCAAP Groundwater Remediation Plan (GRP), BGRS Monitoring Plan has been developed to address the pertinent contaminants being addressed by the BGRS. This Plan was developed by a detailed review of exisiting data collected by the EPA/Minnesota Pollution Control Agency (MPCA), Honeywell, and the U.S. Army. Not all contaminants are present at TCAAP.

COMMENT NO. 10:

EPA has previously stated that there is likely to be a difference in hydraulic streamlines between the Unit 3 and Unit 4 aquifers. EPA's position was set forth in its comments upon the GRAAA (see K. Waldvogel's letter to Mr. Wyatt dated May 31, 1985, and Ms. K. Waldvogel's letter to Mr. Oster dated August 16, 1985). The U.S. Army suggests that the hydraulic streamlines are identical in the two units. The U.S. Army's failure to consider U.S. EPA's position has resulted in an improper conclusion by the U.S. Army with respect to the hydraulic streamlines.

The comments set forth in EPA's May 31, 1985, letter are particularly important due to the recharge of discharged water to the gravel pit under the plan for the proposed BGRS, and the limited model boundaries used by the U.S. Army in modelling the Units 3 and 4 aquifers.

RESPONSE NO. 10:

Regional groundwater flow patterns at TCAAP are very similar for the unconsolidated (Hillside Sand) and bedrock (Prairie du Chien Group/Jordan Standstone) formations, with the exception of localized variations demonstrated by actual field data. The groundwater flow patterns in the vicinity of the BGRS and the gravel pit for both formations are very similar and have been taken into account during system design. Significant variations may exist south of TCAAP and will be addressed in the TCAAP RI/FS currently being conducted by the U.S. Army.

COMMENT NO. 11:

The proposed operable unit constitutes a remedial action. Remedial actions require compliance with the public participation requirements of CERCLA/SARA. Section 117 of SARA states that a proposed remedial action alternative and a discussion of the range of remedial action alternatives which were considered must be presented to the public for review and comment. The final remedial action alternative selected by the EPA, a discussion of any changes from the U.S. Army's proposed alternative (including the reasons for such changes), and a response to the comments, criticisms and data obtained during public comment must be made available to the public prior to commencement of a remedial action.

The U.S Army DROD proposes a remedial action operable unit alternative which was in fact constructed prior to any public participation and prior to EPA selection of a remedial action alternative. This sequence, which the U.S. Army has created, is improper. The fact that wells, pumps and air strippers have been purchased and installed by the U.S. Army prior to public comment and prior to EPA selection of a remedial action alternative will not affect the statutory obligation of U.S. EPA to select that remedial action which most effectively protects the public health, welfare and the environment.

RESPONSE NO. 11:

The continuous transition of hazardous waste regulations practically makes it impossible to address contaminant problems in a timely manner while meeting all regulatory requirements. The Phase I: BGRS was implemented for construction prior to the passage of SARA. Compliance with SARA was initiated in an expedient manner once the law was interpreted without the benefit of comprehensive regulations by EPA for compiling an administrative record and obtaining state participation, required under law to implement SARA. These regulations are still not available.

COMMENT NO. 12:

The DROD prepared by the U.S. Army does not include a reasonable explanation of the proposed plan and alternative proposals considered, as required by CERCLA/ SARA. The commenters must review the GRAAA to review the alternatives. However, the GRAAA does not contain the proposed BGRS. Neither the DROD nor the documents listed in the DROD contain an explanation of why the DROD proposes the BGRS over the alternatives described in the GRAAA. The U.S. Army should make the rationale that lead to the proposal of the BGRS instead of other alternatives, available for public comment.

RESPONSE NO. 12:

The Installation Restoration Program (IRP) GRAAA Report is referenced in the ROD and is available for review by interested parties. The GRAAA addressed reasonable alternatives on a conceptual basis while the final alternative for the interim action was addressed in the IRP TCAAP GRPP, also available to interested parties. The TCAAP RI/FS will address the final remedy for groundwater remediation at TCAAP. The interim action will be modified to comply with the final approved remedy, required under SARA.

COMMENT NO. 13:

In accordance with Sections 120(f) and 121(f) of CERCLA/SARA, State and local officials should have been afforded the opportunity to participate in the planning and selection of the proposed remedial action including the review of studies, reports, and plans. The EPA and the State were supplied the GRAAA that analyzed alternatives. However, the GRAAA did not include the proposed BGRS alternative. The EPA and State comments on the proposed BGRS have consistently focused on the lack of wells designed to prevent migration in the Unit 4 aquifer and the inadequate level of protection for prevention of migration of contaminants off TCAAP. These comments have not been addressed in the proposed BGRS alternative.

RESPONSE NO. 13:

EPA/MPCA has been afforded the opportunity to participate in the TCAAP GRAAA effort and the Phase I: BGRS on numerous occasions. The performance of the BGRS will be determined by the 90-day trial period and followed by modifications, if required, to maintain performance of the BGRS as stated within the ROD. Data are not available to design and construct a comprehensive GRP for all contamination from TCAAP.

COMMENT NO. 14:

The copy of the public notice (dated May 10, 1987), does not explicitly state which of the addresses should be used when submitting comments. Because of the possible confusion, the repositories should be contacted and any comments received by them incorporated in the final plan.

RESPONSE NO. 14:

All comments received responding to the draft ROD were received at the proper address. All public information repositories were contacted to ensure that comments or questions were received at those locations.

COMMENT NO. 15:

The description of the proposed BGRS (page 2 of the DROD) defines the operable unit to be a three phase program. The possible other actions are not certain as no formal proposal (i.e., a DROD) of the actions to be performed has been made at this time. The decision on the proposed BGRS should not include consideration of specific future actions but rather the range of possible future actions. The U.S. Army should demonstrate the consistency of the proposed BGRS with the range of possible future actions.

RESPONSE NO. 15:

Any decision to construct and operate the other two phases referred to in the draft ROD, will be preceeded with a public notice of a draft ROD, a public comment period and a public meeting. The U.S. Army has yet to determine whether it will combine these actions for the on- and off-post systems into one action or handle each separately.

COMMENT NO. 16:

On May 4, 1987, the U.S. Army requested federal ARARS (the applicable, or relevant and appropriate requirements) from the EPA. The Minnesota Pollution Control Agency (MCPA), also received a similar letter requesting State ARARs. Clearly these should have been requested prior to development of the proposed BGRS. The proposed BGRS plan will have to be modified if it does not meet the ARARs provided to the U.S. Army.

The April 29, 1987, letter to the EPA (received by EPA on May 4, 1987) requested a reply on May 4, 1987. Because the request did not state that the request was for a scheduled DROD, on May 5, 1987, EPA told the U.S. Army point of contact that ARARs would be forthcoming.

RESPONSE NO 16:

Item noted. ARARs are a SARA requirement. SARA was not in existence during the design and initial construction phase of the BGRS. See response to Appendix A.11.

COMMENT NO. 17:

Page 4 of the DROD states that the establishment of water quality criteria to establish the degree of remediation for groundwater migrating off TCAAP is not part of the decision on the proposed BGRS. Clearly, criteria to determine the required level of interception by a proposed system to stop migration of VOCs off TCAAP must be part of the decision process in choosing among alternatives to protect human health and the environment.

The EPA believes that health based criteria should be used to determine if the degree of interception of VOCs is adequate to protect human health, welfare and the environment. The EPA has used a 10^{-6} cancer risk as a starting point in

COMMENT NO. 19:

The DROD does not contain a characterization of the horizontal and vertical extent and magnitude of contamination by pollutants, contaminants and hazardous substances. The lack of description makes it difficult for the public to comment on a proposed remedial action chosen from among alternative remedial actions. The plan made available to the public should contain a figure and description of VOC concentrations leaving TCAAP and the degree of capture of VOCs.

RESPONSE NO. 19:

Fact sheets and/or diagrams describing the BGRS and the characterization of known contamination were made available for public and regulatory comment at the public meeting and during the public comment period. The characterization of groundwater contamination has been addressed in various reports prepared by Honeywell which are available in the public information repositories. The degree of contamination captured by the BGRS is addressed within the ROD.

COMMENT NO. 20:

The U.S. Army asserts that ARARs apply only to the discharges of the treatment component of the proposed BGRS. The ARARs apply to the entire system and its operation including substances allowed to migrate off TCAAP, substances allowed to enter the ambient air, and substances discharged with the treated water.

The general requirements of Section 121(b) of CERCLE/SARA as well as ARARs apply in that the remedial action must be protective of human health and the environment. The DROD must include a discussion of how the remedial action satisfies the requirement to protect human health and the environment.

RESPONSE NO. 20:

The BGRS is being proposed as an interim response action. Appropriate ARARs for the cleanup of the contaminated aquifer plume emanating from TCAAP have not been determined and will not be until completion of the TCAAP RI/FS by the U.S. Army and selection of the final remedial action. The U.S. Army proposes that the BGRS should be initiated and continue operation to attain the TRCLE MCL of 5 ppb which the U.S. Army will adopt as appropriate to the BGRS capture criteria pending completion of the RI/FS and agreement on the appropriate capture ARAR for the final TCAAP remedial action. The U.S. Army maintains the BGRS will meet all Federal and Minnesota promulgated standards pertinent to discharge of treated water to groundwater aquifers. The BGRS VOC air stripping columns will emit approximately 9,000 pounds of VOCs per year. This by itself is below the regulated level of 25 tons per year specified in Section 7001.1210 of the Minnesota Rules as requiring a permit. See response, Exhibit B.18.

EXHIBIT B

LETTER

Minnesota Pollution Control Agency
520 LaFayette Road
St. Paul, Minnesota 55155

01 JUNE 1987

EXHIBIT B: Letter, Minnesota Pollution Control Agency, 520 LaFayette Road, St. Paul, Minneosota 55155, 01 June 1987

COMMENT NO. 1:

It is stated that the "TCAAP GRP, Phase I BGRS is the first component of a contemplated three (3) phased plant-wide system designed to address Volatile Organic Compound (VOC) groundwater contamination originating from primary disposal sites at the plant." What does contemplated mean in this case? It is possible that Phases II and III will not be constructed? What are the primary disposal sites at the plant? The NPDES/State Disposal System (SDS) Permit (see Enclosure 3) requires construction of the "Phase II" activities within 120 days after start up of the BGRS. The MPCA believes any "Phase III" activities conducted by the U.S. Army must be consistent with the conclusions of the regional MPCA/EPA Remedial Investigation/Feasibility Study (RI/FS) currently underway and CERCLA.

RESPONSE NO. 1:

The Phase I: BGRS is the first component of the three-phased TCAAP GRP interim response. Phases II and III are currently concepts. Phases II and III will go through the interim Record of Decision (ROD) process. The U.S. Army intends to work closely with the Minnesota Pollution Control Agency (MPCA) and EPA prior to and during design of Phases II and III and the ROD process. These interim responses will be consistent with the final RI/FS, as stated in past documents.

COMMENT NO. 2:

There are three (3) treated water end use alternatives identified. These are:

(1) Raw water supply.

(2) Primary discharge to the TCAAP Sand and Gravel Pit.

(3) Possible secondary discharge into Rice Creek.

The recently modified NPDES/SDS Permit issued to the U.S. Army currently does not allow for VOC-treated regional groundwater discharge to Rice Creek because of potential surface water phosphorus loading and to promote water conservation. If the U.S. Army does discharge the treated waters to Rice Creek, the U.S. Army will be in direct violation of the Permit. Also, it is noted that the source flushing end use alternative identified in the GRPP is not included in the draft ROD. Please explain.

No maintenance plans have been submitted for the BGRS. Please explain what actions will occur for routine maintenance or emergency breaks.

RESPONSE NO. 2:

The U.S. Army has deleted end use of the treated water as a raw water supply and as a discharge into Rice Creek. Source flushing as a part of aquifer recharge will be evaluated under the Phase II: TGRS and, if considered an appropriate end use of the water, it will be presented in the TGRS or subsequent RODs. Operations and maintenance manuals will be prepared and the system will shut down completely for repairs or during emergencies. See response, Exhibit K.3.

COMMENT NO. 3:

The U.S. Army has not submitted any documents outlining modification provisions for ensuring capture of VOC contaminated groundwater in other regional aquifers. The NPDES/SDS Permit noted above specifically outlines the procedures (including schedule) necessary to address all regional groundwater contamination emanating from TCAAP. See Enclosure 3, Sections 2.1.1.3, 2.1.2.3, and 2.2.1.3 and 2.5. Does the Army intend to comply with all conditions of the NPDES/SDS Permit? In addition, what funding provisions has the Army made to modify the BGRS to meet all conditions of the NPDES/SDS Permit?

RESPONSE NO. 3:

Details of modifications, as required, cannot be determined until after data is obtained from actual operation. Evaluation of the operational data will occur and modifications developed to obtain/maintain system performance levels. These modifications will be coordination with regulatory agencies. Compliance with SARA will be maintained throughout this effort and funds will be available to complete modifications.

Under Section 121(e) of CERCLA, no Federal, state, or local permits are required for a remedial action conducted entirely onsite where the remedial action is selected and carried out in compliance with Section 121. By its opportunity to review and comment on the documents listed in Table 3 of the Interim Response Decision Record (IRDR) and by its comments on the IRDR, Minnesota was provided a substantial and meaningful involvement in the initiation, development, and selection of the BGRS as an interim response measure, pursuant to Section 121(f) of CERCLA. The BGRS will treat the effluent to the maximum contaminant level (MCL), or where none is listed, the MCL goal or ambient water quality criteria for carcinogenicity listed in Table 1 of the IRDR. The requirements for an air quality permit, a groundwater appropriation permit, and the actions identified in Attachment 1 are extraneous to ARARs for water discharge requirements normally imposed by a NPDES permit, and the U.S. Army does not intend to comply with these provisions of the permit as well as other procedural requirements set forth in the permit. However, the U.S. Army will work with the MPCA to determine any legally applicable or relevant and appropriate air emission standards.

COMMENT NO. 4:

The BGRS is a remedial action and, therefore, requires EPA Administrator approval.

RESPONSE NO. 4:

The BGRS is proposed as an interim remedial action. Pursuant to Section 10 of Executive Order 12580, the administrator of EPA must concur only with the final TCAAP remedial action. The U.S. Army is however seeking EPA's concurrence on the initiation of BGRS operations.

COMMENT NO. 5:

The MPCA was consulted about the BGRS. However, our review of the Army's draft ROD indicates that MPCA comments provided the Army (see Enclosure 1), on the BGRS were not evaluated and/or incorporated into design and construction of the system.

RESPONSE NO. 5:

Previously provided comments by the MPCA were reviewed and incorporated wherever possible into the BGRS.

COMMENT NO. 6:

It should be noted that the Report No. 129 was published in October 1978, not October 1979. The MPCA never received a copy of this report from the Army.

RESPONSE NO. 6:

Report No. 129 was published in October 1978. Records show that a copy of this report was provided to the MPCA when the groundwater contamination issues were found in approximately July of 1981.

COMMENT NO. 7:

On-TCAAP regional monitoring wells located downgradient of disposal sites have shown VOC contamination at levels in excess of 40 parts per million (ppm); private drinking water wells located immediately adjacent to and downgradient of TCAAP have VOC contamination levels in excess of 7 ppm (i.e., 7,000 parts per billion). Therefore, the Army's references to low contaminant levels is in error.

RESPONSE NO. 7:

Item noted. ROD will be corrected.

COMMENT NO. 8:

The MPCA staff agrees that "Municipal wells owned by the city of New Brighton have been affected by VOC contamination originating from TCAAP." However, significant data exists to indicate that the TCAAP contamination extends beyond the New Brighton municipal wells.

RESPONSE NO. 8:

The U.S. Army notes that contamination from TCAAP has reached the New Brighton municipal well field and could extend beyond this area. The TCAAP RI/FS will address "How much beyond the New Brighton municipal well field the contamination has migrated."

COMMENT NO. 9:

It should be noted that previous interim response actions to provide potable water to residents of Arden Hills, New Brighton, and St. Anthony were provided by the EPA and/or MPCA. Additional response actions are underway to provide or maintain adequate drinking water supplies in New Brighton and Arden Hills as a result of the regional groundwater contamination. Also, it should be noted that the Mengelkoch & Gordon Rendering Plants are using bottled water for drinking water supplies due to the regional contamination. Therefore, the Army's statement regarding available alternative water supplies is misleading.

RESPONSE NO. 9:

Item noted. ROD will be corrected.

COMMENT NO. 10:

The GRAAA outlines six (6) groundwater extraction scenarios. The BGRS as described in the Record of Decision on Operable Unit does not conform to any of the six scenarios. How was the BGRS system chosen if the GRAAA did not include the BGRS system as an evaluated alternative? Furthermore, selection of remedy that was not discussed as a ROD alternative is inconsistent with the procedures in CERCLA and the NCP, as discussed earlier.

RESPONSE NO. 10:

See response to Exhibit A, 12.

COMMENT NO. 11:

The U.S. Army states the "BGRS system...is expected to achieve a zone of capture to 10 parts per billion (ppb) trichloroethylene (TCE) at the southwest boundary." Honeywell's April 27, 1987, written comments to us contradict this statement. Honeywell, the U.S. Army's contractor for the BGRs, estimated that (1) 100 percent removal of VOCs from Unit 3, and (2) 25 - 100 percent removal of VOCs from Unit 4" would occur. Does the U.S. Army's statement of zone of capture to 10 ppb of TCE include both the Unit 3 and Unit 4 aquifers? How and why does the U.S. Army's zone of capture estimate differ from that of Honeywell?

The NPDES/SDS Permit requires an aquifer cleanup level of 2.8 ppb TCE (see Enclosure 3, Section 3.1, Table 2.1). Also, Section 120(d) of CERCLA requires the attainment of Maximum Contaminant Level Goals (MCLGs), including 2.8 ppb for TCE. How was the 10 ppb TCE aquifer cleanup level developed and chosen since a health risk assessment was never conducted at TCAAP?

RESPONSE NO. 11:

See response to Exhibit A.1, Exhibit A.2, and Exhibit A.3.

COMMENT NO. 12:

The Army states that "there are hazardous substances but no known pollutants or contaminants, as defined by SARA, crossing the boundary." The MPCA disagrees with this statement given that the definition of "pollutant or contaminant" does include several of the substances found migrating from TCAAP. These substances are known or suspected cancer causing compounds.

RESPONSE NO. 12:

See response to Appendix A.18.

COMMENT NO. 13:

The NPDES/SDS Permit establishes water quality criteria for groundwater migrating off TCAAP. See Enclosure 3, Section 3.1, Table 2.1. The BGRS must be modified, within the appropriate time frames to meet these criteria.

RESPONSE NO. 13:

The NPDES/SDS does not establish water quality criteria for groundwater migrating off TCAAP. Section 3.1. of Attachment 1 of the NPDES/SDS permit contemplated the U.S. Army proposing ARARs based on Section 121 of SARA. Table 2.1. is the EPA and MPCA recommended criteria levels. For the BGRS interim response action, the U.S. Army has not proposed a water quality criteria for groundwater migrating off TCAAP. This will be proposed in the RI/FS for final remedial action. However, the U.S. Army will adopt for the BGRS the TRCLE MCL of 5 ppb promulgated under the Safe Drinking Water Act. Specifically, the U.S. Army does not agree that Minnesota recommended allowable limits for drinking water are ARARs, as they are not promulgated State criteria within the meaning of Section 121d(a)(ii).

COMMENT NO. 14:

The MPCA does not agree with the Army's interpretation of factors applied in selection ARARs. As stated in CERCLA Section 120(a)(2), "all guidelines, rules, regulations and criteria...applicable to remedial actions...shall also be applicable to facilities which are owned or operated by...the United States..."

RESPONSE NO. 14:

ARARs are to be selected pursuant to Section 121(d) of CERCLA. Section 120(a)(2) of CERCLA provides that "all guidelines, rules, regulations, and criteria... applicable to remedial action (applicable to NPL facilities) shall also be applicable to facilities owned or operated by... the United States." As to selection of ARARs, this means that ARARs shall be selected pursuant to Section 121d of CERCLA and the National Contingency Plan.

COMMENT NO. 15:

Minnesota Water Quality Standards are now found in Minnesota Rules, Chapter 7050. Similar incorrect citations are to be found on page 6 of the draft ROD.

RESPONSE NO. 15:

The U.S. Army has decided that the BGRS treated water will only be used for aquifer recharge. There will be no surface water discharge.

COMMENT NO. 16:

ARARs apply both to treatment prior to discharge and groundwater cleanup.

RESPONSE NO. 16:

While ARARs apply both to treatment prior to discharge and groundwater cleanup, the IRDR for the BGRS did not identify an ARAR for groundwater cleanup. However, the U.S. Army will adopt the TRCLE MCL as the appropriate BGRS capture criteria. The appropriate ARARs for groundwater cleanup will be addressed in the TCAAP RI/FS being conducted by the U.S. Army. The final groundwater cleanup ARARs will be based on the selection of a final remedy and approval by the EPA administrator. See response to Exhibit A. 1, Exhibit A.2, Exhibit A.3, and Exhibit A.20.

COMMENT NO. 17:

Regarding applicable State standards for raw water supplies and surface water discharges, it appears from review of the draft ROD that the Army has chosen to use only numeric standards from Chapter 7050 and has not addressed the impact of narrative standards in this Chapter as it would affect ARARs. These narrative sections allow the MPCA to derive criteria and set standards to protect human consumption of water and aquatic organisms, and protect aquatic life from acute and chronic toxicity, taste impairment and bioaccumulation in groundwater and surface waters as appropriate. These are essentially the same criteria which the draft ROD has identified as relevant and appropriate on page 5 as Federal ARARs.

State ARARs for water have been provided in the modified NPDES/SDS Permit as Recommended Criteria Levels. These criteria are the most restrictive of Federal and State standards and criteria, which are considered relevant and appropriate for discharge to the gravel pit and a final cleanup levels in the groundwater (see Table 2.1 of the Permit). These levels conform to requirements specified in SARA, Section 121(d).

RESPONSE NO. 17:

See response Exhibit B.15.

COMMENT NO. 18:

As previously requested in the NPDES/SDS Permit, the Army must submit to the MPCA an Air Quality Emissions Facility Permit Application. The MPCA does not view the BGRS as a separate facility for the purpose of an air quality permit. Rather, the TCAAP facility includes all air emissions sources, including the BGRS. The Army must consider compliance with Best Available Control Technology (BACT) to address air emissions from the TCAAP facility.

RESPONSE NO. 18:

Section 121(e) of CERCLA provides that no Federal, state, or local permit is required for remedial actions conducted entirely onsite, where the remedial action is selected and carried out in compliance with Section 121. Therefore, the U.S. Army does not intend to submit an application for an air quality emission facility permit. However, the U.S. Army agrees that emission from the BGRS must be considered with the air emissions from other installation restoration treatment facilities on TCAAP. Section 7005.0100 of the Minnesota Rules, Chapter 7005, subp. 44, defines a "total emission facility" as an assemblage of all emission sources on adjacent property that are under common ownership or control and that exist for a common function. Section 7001.1210 requires a permit for a total emission facility with potential emissions of single criteria pollutants of more than 25 tons per year. If the total potential emissions of VOCs from all the installation restoration treatment facilities at TCAAP is greater than 25 tons, the U.S. Army will submit sufficient information to the MPCA for it to identify the ARAR and will modify the BGRS to include the necessary pollution abatement equipment.

COMMENT NO. 19:

How can the Army assure that air emissions (which include suspected or known human carcinogens) from the BGRS and other TCAAP sources and potentially totalling forty tons not adversely impact human health, welfare and the environment?

RESPONSE NO. 19:

The estimated amount of VOCs emitted from the BGRS is expected to be on the order of that emitted by an average dry cleaning establishment (approximately 23 pounds/day). Given the isolated location within TCAAP and distance from the emissions source and closest Plant boundary, no adverse effects are expected from this sytem. Dry cleaning establishments are commonly found in high density

population areas. Results of prior emission studies conducted for the in-situ volatilization (ISV) system at Site D indicated no adverse effects from the system emitting approximately six times the amount of VOCs than the BGRS. The emissions at Site D were coordinated with the environmental regulators. See also response, B.18.

COMMENT NO. 20:

Table 1 contains two columns containing MCL's and MCLG's. Which column applies to the establishment of cleanup standards? It is apparent from the draft ROD that the Army intends to have standards applied to the BGRS treatment system only (bottom of page 5), and will dispense with cleanup standards for the affected aquifer until such time a health risk assessment is completed through the RI/FS (top of page 7). Without a published health risk assessment document, how can the Army proceed with remedial actions without having standards or utilizing less stringent standards/criteria than those identified in the NPDES/SDS Permit in Table 2.1? What is the specific justification for dispensing with cleanup standards for the affected aquifers now?

RESPONSE NO. 20:

See responses to Exhibit A,2. and Exhibit A,3.

EXHIBIT C

LETTER

Briggs and Morgan Law Offices Professional Association
220 First National Bank Building
St. Paul, Minnesota 55101

01 June 1987

EXHIBIT C: Letter, Briggs and Morgan, 2200 First National Bank Building, St. Paul, Minnesota 55101, 01 June 1987

COMMENT NO. 1:

Specifically, pursuant to Section 117 of SARA, the Army is required to publish "sufficient information as may be necessary to provide a reasonable explanation of the proposed plan and alternative proposals considered." Neither the public meeting nor the published documents have provided any analysis of alternative proposals that were considered and rejected.

RESPONSE NO. 1:

Section II of the ROD satisfies the requirement to provide a reasonable explanation of the proposed plan and alternative proposals considered, especially by including references to the GRAA, GRPP, and other referenced documents available for public review.

COMMENT NO. 2:

The Army has also failed to comply with Section 120 of SARA. Section 120 governs remedial efforts conducted on federal facilities and requires that state and local officials have "the opportunity to participate in the planning and selection of the remedial action." Neither the City of St. Anthony nor the State of Minnesota were invited or included in the planning or selection of the BGRS.

RESPONSE NO. 2:

Table 3 of the IRDR indicates that both the EPA and the MPCA had the opportunity to review and comment on documents related to the planning and selection of the BGRS. The contract documents and specifications were available for review in August 1986. Section 120(f) of CERLA did not become effective until passage of SARA on October 17, 1986. While the State of Minnesota had ample opportunity to participate in the planning and selection of the BGRS, the newly enacted requirement to afford local officials an opportunity to comment on the planning and selection of the BGRS was no longer possible except through their comments on the IRDR and at the public hearing.

COMMENT NO. 3:

Finally, Section 211 of SARA provides that whenever possible and practical, the Secretary of Defense shall establish a technical review committee to review and comment on Department of Defense actions and proposed actions with respect to releases or threatened releases of hazardous substances at federal installations. Although it appears that the U.S. Army is in the process of establishing such a technical review committee, obviously such a committee is not now in existence and has not had the opportunity to review the BGRS.

RESPONSE NO. 3:

Section 211 of SARA provides for the establishment of a technical review committee, whenever possible and practical. The existence of such a committee is not a precondition for a decision to operate the BGRS.

COMMENT NO. 4:

As I noted at the public hearing on May 20, 1987, the BGRS is only a very limited and partial response to the groundwater contamination problem caused by improper disposal practices at TCAAP. As the U.S. Army has admitted in press releases and fact sheets, it has known about the hazardous waste problem at TCAAP since at least 1978. It is only now taking the first step to stop further contamination from leaving TCAAP. As the comments by Mr. Bruce A. Liesch Associates, Inc., point out, the BGRS system will only be partially effective in stopping further contamination. Even under the Army's own schedule, a final remedial action will not be implemented until at least 1989.

Furthermore, the Army has made no commitment to addressing the concerns of the citizens who have been affected by this contamination problem. These citizens have had their health adversely affected and have suffered property damages and other expenses and inconveniences. The Army has failed to propose a program for monitoring the health of the citizens affected by the groundwater contamination problem or a program to compensate the affected individuals for the damage done to their health and property.

Finally, the Army is arbitrarily taking the position that the plume of contaminated groundwater only reaches as far as the City of New Brighton. Again, the comments by Mr. Bruce A. Liesch Associates, Inc., demonstrate the weakness in the Army's position in this respect. Rather than adopting a slow-paced and piecemeal approach to dealing with this regional contamination problem, the Army should acknowledge and respond to the adverse consequences that have affected the citizens of this area as well as the City of St. Anthony.

RESPONSE NO. 4:

The IRP TCAAP Chronology is provided to demonstrate that the U.S. Army has been responsive to address contamination at TCAAP. The complexity and magnitude of the TCAAP site is easily overlooked with hindsight. However, even with the constant change in environmental regulations, progress has been made and will continue to address the environmental problems at TCAAP in a fashion that incorporates public health, environmental technology, and economic constraints.

INSTALLATION RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT
CHRONOLOGY

I. IRP TCAAP Background.

A. The U.S. Army Installation Restoration Program (IRP) was initiated in 1975 prior to legislation of the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) regulations. The IRP was developed in order to address contaminant releases from past industrial and disposal activities at U.S. Army properties and to conduct response actions to safeguard public health and/or the environment from those releases. The Initial Installation Assessment of TCAAP, Report No 129, October 1978, was the first effort conducted at TCAAP through the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) in order to address suspected contamination at the Plant. This effort consisted of a records review of TCAAP documentation and personal interviews of employees to determine the potential for contaminant migration. Findings from this effort did not indicate a significant potential for contaminant migration from the Plant. Volatile organic compounds (VOCs) were not regulated by the U.S. Environmental Protection Agency (EPA) in 1978 and were not addressed in the October 1978 report.

B. The Minnesota Pollution Control Agency (MPCA) conducted a limited sampling and analysis effort for VOCs in groundwater in the TCAAP/New Brighton area in June 1981 following the recognition of VOCs as regulated contaminants and discovered the presence of trichloroethylene (TRCLE) throughout the area. TRCLE was discovered at TCAAP production wells and New Brighton municipal wells. These findings indicated the Plant as a potential source of VOC contamination in the area due to industrial activity and associated disposal from that activity.

C. Field investigations to address VOC groundwater contamination at TCAAP were initiated in 1981 through USATHAMA. The field investigations consisted of, namely:

-- TCAAP Environmental Contamination Survey, Phase I, Report, May 1983.

-- TCAAP Environmental Contamination Survey, Phase II, Report, June 1984.

The objectives of these two (2) efforts were to determine the extent and sources of VOC contamination present on the Plant and to determine the contribution of each identified disposal site to groundwater contamination, both localized (perched water) and regional (groundwater common to New Brighton and TCAAP), respectively.

D. TCAAP Environmental Contamination Survey, Phase I, May 1983, findings indicated the presence of VOCs in groundwater, both in the interior and adjacent the southwest boundary of the Plant. Contamination present in the New Brighton municipal wells could not be definitively associated with TCAAP due to lack of data between New Brighton and the Plant where other potential disposal areas, not associated with TCAAP, were suspected. Residents with contaminated wells located adjacent TCAAP were not thought to be solely affected by the Plant.

E. TCAAP Environmental Contamination Survey, Phase II, June 1984, findings indicated several areas as primary contaminant sources. These sources include:

Site D - Open Burn/Leaching Pits Area
Site G - Landfill/Dump Area
Site I - Building 502 (Honeywell)

as primary sources to regional VOC groundwater contamination, and:

Site K - Building 103 (Honeywell)

as a primary source to local (perched) VOC groundwater contamination. Groundwater monitoring was recommended at the secondary sources in order to monitor contaminant levels at these sites.

F. TCAAP Engineering Analysis of Alternative Remedial Measures, Phase III, June 1984, indicated remedial action was required at Site D and Site G. Evaluation of alternatives in this Report determined in-place decontamination as the response action. The in-situ volatilization (ISV) technology was selected for implementation at Site D and Site G. Honeywell (a tenant of TCAAP) selected in-place groundwater source control for decontamination of Site I and Site K as response actions.

G. TCAAP Groundwater Remedial Action Alternatives, February 1986, indicated the need for regional groundwater remediation at TCAAP. This need is being addressed jointly through the Department of the Army (DA)/Honeywell Agreement, July 1985. DA and Honeywell have initiated the TCAAP Groundwater Remediation Program (GRP), June 1986, which addresses the regional groundwater contamination at TCAAP. The TCAAP GRP consists of the following:

Phase I: Boundary Groundwater Recovery System (BGRS)
Phase II: TCAAP Groundwater Recovery System (TGRS).
Phase III: Plume Groundwater Recovery System (PGRS).

The Phase I: BGRS is completed and awaiting startup after completion of the Record of Decision process required under the Superfund Amendments and Reauthorization Act of 1986 (SARA). The remaining phases will be constructed following startup of the Phase I: BGRS.

H. Honeywell has conducted and is continuing off-TCAAP investigations to determine the magnitude and extent of contaminant migration past the TCAAP boundary. Results of these studies now indicate TCAAP as a major source of VOC groundwater contamination in the region including the city of New Brighton municipal well field. The total extent of contaminant migration is not known but will be addressed in the current TCAAP Remedial Investigation/Feasibility Study (RI/FS) currently being conducted by DA.

II. Significant Actions:

A. In May 1983, the U.S. Army began supplying bottled water to six private residences adjacent the southwest boundary of TCAAP. Since that time, these residences, along with others in the area, have been connected to municipal water systems.

B. In August 1983, concurrent with TCAAP Environmental Contamination Survey, Phase II, work, a Technical Review Committee (TRC) was established, comprised of representatives from the Army, the MPCA, and EPA Region V (Honeywell joined in 1984). The committee reviews proposed program approaches for technical adequacy and acts as a forum for exchange of technical information between the parties.

C. In July 1984, the city of New Brighton filed an $8 million dollar claim against the Government for costs associated with new well construction. Additionally, some 22 families have filed claims against the Army for property damage and personal injury.

D. The U.S. Army announced on 14 June 1985, and has subsequently initiated, the TCAAP Remedial Action Plan (RAP) designed to clean up some sites and contain others on TCAAP. These actions include source removal, groundwater treatment, temporary capping and soil treatment with an ISV system. This plan is being jointly funded and conducted by the Army and Honeywell, Inc. The total cost of the program, including funds already expended, is about $20 million dollars. A revised TCAAP RAP was provided to the regulators in May 1987 incorporating current results of the IRP.

III. Current Status.

A. The Army has begun the TCAAP RI/FS to address the long-term cleanup solution for TCAAP. The draft final TCAAP RI/FS is scheduled to be available for public comment in December 1988. Following the public comment period and subsequent Record of Decision, the Army will enter into an interagency agreement with EPA Region V regarding the final remedial action.

B. While the TCAAP RI/FS is being conducted, the Army is continuing to implement interim response actions at the Plant. The interim actions are those announced in June 1985 and revised in May 1987.

C. In October 1986, Congress passed SARA which specifically delineates public participation during the remedial action progress, including interim and removal actions.

EXHIBIT D

LETTER

SAINT ANTHONY VILLAGE
Administrative Offices
3301 Silver Lake Road
St. Anthony, Minnesota 55418

28 MAY 1987

EXHIBIT D: Letter, Saint Anthony Village, 3301 Silver Lake Road, St. Anthony, Minnesota 55418, 28 May 1987

COMMENT NO. 1:

First, the estimated removal of contaminants at the TCAAP boundary through the proposed system sounds impressive. We are unable to determine, however, whether removal of contaminated water from deeper aquifers through an "upward draw" from the boundary wells can be effectively accomplished. Further, we see no method for verifying that such removal from lower acquifers has actually taken place.

RESPONSE NO. 1:

Determination of groundwater capture from the bedrock formations will be determined during the 90-day trial period of the BGRS. Evaluation of geohydrologic data collected under the IRP TCAAP BGRS Monitoring Plan will determine the extent of groundwater capture within the bedrock formations. Modifications, if required, will be initiated based upon results of the data collected.

COMMENT NO. 2:

The removal of 68 tons of pure TRCLE from the soils at two small sites on the TCAAP facility is particularly worrysome to us and we hope that this helps to demonstrate clearly to the Army the true severity of the problem. The Army themselves confess that 68 tons so far removed is vastly more than they ever dreamed that they would recover. We hope that recognition of the contamination problem as more severe than they might have suspected will prompt them to take quicker action on other planned remedial activities.

RESPONSE NO. 2:

The removal of TRCLE from soil at two sites, namely, Site D and Site G, represent an important step to addressing contamination at TCAAP. These two sites represent primary disposal areas and are in no way to be considered as "small" sites. The U.S. Army does recognize and has quantified the disposal problems at TCAAP and will continue to address those problems in an expedient manner.

COMMENT NO. 3:

Most importantly, the actions proposed by the Army do not address the regional groundwater contamination problem. The Army has acknowledged that the aquifer used by the city of New Brighton has in fact been contaminated due to TCAAP waste disposal practices.

RESPONSE NO. 3:

The Phase I: BGRS is only the first phase of the program designed to mitigate contamination from crossing the Plant boundary. The TCAAP GRP is a multiphased program that does address the regional groundwater contamination.

COMMENT NO. 4:

Data clearly shows this contamination to have migrated to the St. Anthony area, and the Army thus far refuses to acknowledge the fact. We suspect that such refusal may have something to do with the liability exposure faced by the Army and others. We perceive their behavior to be bureaucratic foot-dragging and we demand action. Only the taxpayers suffer due to delays and since we are responsible to our common constituency, the taxpaying public, it behooves all of us to move with speed and prudence in solving this critical regional water contamination problem.

RESPONSE NO. 4:

Substantial data is required to clearly determine the responsible parties and also to evaluate and design remedial actions. No data, to our knowledge, clearly demonstrates without question that contamination from TCAAP has migrated into the Saint Anthony area.

EXHIBIT E

LETTER

LeFevere, Lefler, Kennedy, O'Brien and Drawz
2060 First Bank Place West
Minneapolis, Minnesota 55402

01 June 1987

EXHIBIT E: Letter, LeFevere, Lefler, Kennedy, O'Brien and Drawz, 2060 First Bank Place West, Minneapolis, Minnesota 55402, 01 June 1987

COMMENT NO. 1:

The Twin City U.S. Army Ammunition Plant (TCAAP) BGRS was first proposed by the Army as part of a Requested Modification to NPDES Permit No.: MN 0056952. The Minnesota Pollution Control Agency (MPCA) expanded the scope of that Requested Modification to include a schedule for extraction and treatment from all contaminated regional groundwater aquifers. The City supported that Proposed Permit by Written Comment dated April 24, 1987, John E. Drawz to Gary Kimball. A copy of that Written Comment is attached as Exhibit One and is incorporated herein by reference. Those comments supported the Proposed Permit while requesting consideration of the following:

(1) A system effective monitoring program.

(2) Study and monitoring of the effect of effluent discharge to the gravel pit.

(3) Study of Rice Creek discharge alternative. See Exhibit One. The City reasserts those concerns and asks for their full consideration relative to the TCAAP GRP, Phase I: BGRS.

RESPONSE NO. 1:

The U.S. Army plans to perform items (1) and (2) above but has decided not to discharge into surface waters such as Rice Creek.

COMMENT NO. 2:

The MPCA issued its Authorization to Discharge and to Construct Wastewater Treatment Facilities Under the National Pollutant Discharge Elimination System and State Disposal System Permit Program, Permit No.: MN 0056952 following the Public Comment Period. The City is in full support of that Permit and believes the Army should comply with its terms including those relative to the BGRS.

RESPONSE NO. 2:

The U.S. Army withdrew its application for a NPDES permit for discharge of treated water from the BGRS. Under SARA Section 121(e), no state permits are required for remedial action conducted onsite. The U.S. Army will adhere to any substantive requirements of the permit which are legally applicable or relevant and appropriate under the circumstances.

COMMENT NO. 3:

The City is also in full support of the requirements in Minnesota Department of Natural Resources (DNR) Appropriation Permit 87-6048 issued to the U.S. Army for the

BGRS on May 13, 1987. The City is especially supportive of the monitoring conditions that require Unit 3 and 4 capture zones and that study the effect of the discharge to the ****(k)ame (same?) on the capture zones be defined. The City believes that the Army should comply with that DNR Permit 87-6048 in its entirety in the Army's proposed TCAAP GRP, Phase I: BGRS.

RESPONSE NO. 3:

The U.S. Army intends to withdraw its Minnesota DNR Appropriation Permit No. 87-6048. Since this is a remedial action being taken consistent with SARA, no state permits are required. Also, the U.S. Army will modify its plan to use approximately 40,000 gallons per day of treated water. Instead, all of the treated water will be placed in a former gravel pit for return to the aquifier. Consequently, none of the water extracted by the BGRS will be put to beneficial use, and no water appropriation permit is necessary.

COMMENT NO. 4: In the Declarations' Section of the Draft ROD, the Army acknowledges that the BGRS is only an "interim remedy." The City wishes to emphasize the importance of quickly reaching a comprehensive final remedy which requires a regional cleanup of the contaminated groundwater on and off TCAAP. That final remedy must be reached with the regulatory agencies and affected parties including the MPCA, DNR, Minnesota Department of Health, EPA, and the city of New Brighton.

RESPONSE NO. 4:

Item noted, however, this is not relevant to a decision to operate the BGRS.

EXHIBIT F

LETTER

Bruce A. Liesch Associates, Inc.
3131 Fernbrook Lane
Minneapolis, Minnesota 55441

27 May 1987

EXHIBIT F: Letter, Bruce A. Liesch Associates, Inc., 3131 Fernbrook Lane, Minneapolis, Minnesota 55441, 27 May 1987

COMMENT NO. 1:

Generally speaking, any activities initiated by TCAAP to minimize continued offsite migration of contaminants originating from TCAAP is supported. Our major concern with the proposal is the scope of the BGRS and timing of future expansion. Timing is a concern because additional measures to enhance or expand upon the BGRS will not be completed until sometime in 1988 with final remedial actions in 1989. This future work includes the expansion of the Hillside Sand boundary recovery system and installation of a bedrock boundary recovery system. In that the proposed BGRS is an interim measure to intercept contaminated groundwater before it leaves TCAAP, the system should be expanded immediately to intercept all contaminated groundwater leaving TCAAP.

RESPONSE NO. 1:

The BGRS is an interim response for the southwest boundary. Expansion of the system will require evaluation of system performance and completion of the RI/FS. See Exhibit A.1, Exhibit A.2, and Exhibit A.3.

COMMENT NO. 2:

The Army and Honeywell have expended a substantial effort to characterize contaminants at and adjacent to TCAAP. This characterization has defined the extent, both laterally and vertically, of contaminants within the Hillside Sand and, to a lesser extent, the bedrock. Knowing the extent of contamination, it should not be difficult to expand the BGRS system laterally to intercept, at a minimum, groundwater exceeding established or proposed drinking water criteria. This would better allow the Army to make the statement that 100 percent of the contaminated groundwater in the Hillside Sand is intercepted. The present proposal does not accomplish that.

The proposed system may also allow VOC's with concentrations that exceed 10 ug/l, to move past the north and south borders of groundwater recovery area. When comparing the projected interception area for the BGRS and TGRS as presented in the GRPP with the Unit 3 contamination extent presented in the Phase I: 96-10-8 Triangle Supplement Report, February, 1987, the proposed system will allow VOC's exceeding 10 ug/l past the recovery system.

Not only does the proposed system not intercept all contaminated groundwater, because it is designed to intercept only up to 10 ug/l, but the system will not intercept the plume presented by Conestoga-Rovers in the February, 1987 Report.

There also does not appear to be a basis for selecting 10 ug/l as the recovery standard at the boundary. Using this standard, contaminated groundwater will still migrate past the TCAAP southwest boundary even if the system works as designed.

RESPONSE NO. 2:

It was estimated that the BGRS would capture VOCs currently migrating off the southwest boundary of TCAAP which lie within the 10 ug/l trichloroethylene contour. The estimate is qualified by stating that the actual performance of the BGRS would not be known until the BGRS is turned on. The BGRS was designed to capture VOCs leaving the southwest boundary of TCAAP. It was designed as a prudent first step in a three-phased performance oriented remedial program. The 10 ug/l number was never designated as a cleanup standard, but rather an estimated level of capture. The U.S. Army has decided to adopt the TRCLE MCL of 5 ppb as the appropriate BGRS capture criteria. It has been repeatedly stated in correspondence and reports that a final cleanup criterion must be developed through an appropriate risk assessment process. The BGRS can be expanded or reduced as necessary under the TGRS and PGRS phases to be consistent with the final remedy.

COMMENT NO. 3:

An area generally ignored at this point has been the migration of contaminants in the bedrock aquifers. The Army has indicated that the bedrock wells may be installed as part of the TGRS, the need of which is to be evaluated from pumping of the BGRS. This appears to ignore the fact that the regional groundwater contamination has occurred from migration of contaminants through the bedrock system.

A bedrock recovery system should be installed immediately to intercept groundwater migrating offsite through the bedrock. There does not appear to be a reason for delaying the installation and testing of this system since there is not an adequate monitoring network to assess the effectiveness of the BGRS in intercepting bedrock contamination.

The Army proposed to determine the need for bedrock recovery wells along the southwest TCAAP border based on the drawdown influence in the bedrock from BGRS pumping. To do this, a series of well nests would need to be present to determine the hydraulic response in the upper, middle, and lower units of both bedrock aquifers. This is needed to observe how deep the hydraulic response from the BGRS system operation propagates. A fully penetrating bedrock well will not address this question because the majority of the response would be expected in the upper bedrock. As such, the response in the lower unit of the bedrock cannot be established. A monitoring network such as this is not present for determining this differential hydraulic response. If the effectiveness of the BGRS cannot be documented, then there is no basis for waiting until the BGRS is operational and tested before initiating bedrock recovery well installation.

RESPONSE NO. 3:

The BGRS does not include bedrock recovery wells. However, the recovery of VOCs from bedrock is expected since pumping from the Hillside Sand aquifer promotes upward flow from the bedrock. The effectiveness of bedrock capture from the BGRS will be demonstrated by bedrock flow patterns surrounding the capture system which should demonstrate an induced gradient inward and upward to the pumping

wells. Nested bedrock wells exist at well sites 802(T2), 806(T6), 003(S3), and 027(S27). These nested wells will be used along with other bedrock wells to evaluate performance as stated in the BGRS Monitoring Plan. Per the Groundwater Remediation Program Plan (GRPP), the TGRS may be expanded to include bedrock groundwater recovery directly from the bedrock using bedrock wells. Also, additional bedrock monitoring wells may be proposed under the TGRS if needed to demonstrate performance.

COMMENT NO. 4:

The proposed bedrock system proposed in the GRPP does not include recovery of the south plume as defined by Camp, Dresser & McKee (CDM), in the Multi-Point Source Remedial Investigation. Without interception of the south plume, a bedrock plume will continue to migrate from TCAAP, even after the TGRS is fully implemented.

RESPONSE NO. 4:

The Phase I: BGRS addressed groundwater contamination based on hard field data collected by EPA/MPCA, Honeywell, and the U.S. Army. A multitude of data has been collected since completion of the limited "Multi-Point Source Remedial Investigation" which primarily uses numerical modeling approximations for contaminant definition in groundwater. The bedrock plume has been defined beyond TCAAP boundaries to the New Brighton vicinity using monitor wells (field data) and not numerical modelling which may or may not reflect the actual situation.

COMMENT NO. 5:

The subject of the extent of the bedrock contamination also needs to be addressed by the Army. At present, the documents from the Army suggest that the bedrock contamination associated with disposal activities at TCAAP extends only to the City of New Brighton. There has been no justification of why contamination ends there or where it goes, even though TRCLE levels of hundreds of ppbhave been observed in the New Brighton production wells.

The preponderance of data, including geologic setting, groundwater hydraulics, observed contaminants, and computer modeling support the position that the St. Anthony well contamination is part of a large regional contaminant plume the source of which is TCAAP. We would request that the Army acknowledge that the city of St. Anthony is also impacted by contamination from TCAAP and note that in all future documents discussing the regional contaminant extent.

RESPONSE NO. 5:

The extent of VOC contamination originating from TCAAP has not been completely defined as discussed in the ROD. The extent of contamination is being addressed under the TCAAP RI/FS currently being conducted by the Army. Data collected under the TCAAP RI/FS will be interpreted to better define the regional groundwater problem including any effects on Saint Anthony. Data is not available that can justify TCAAP as the only source of regional contamination within the New Brighton/Arden Hills National Priority List site.

EXHIBIT G

LETTER

Citizens For A Better Environment
1515 E. Lake Street
Minneapolis, Minnesota 55407

01 June 1987

EXHIBIT G: Letter, Citizens For A Better Environment, 1515 E. Lake Street, Minneapolis, Minnesota 55407, 01 June 1987

COMMENT NO. 1:

Is the public water supply (New Brighton, St. Anthony, Arden Hills) safe? What criteria is your response based on?

RESPONSE NO. 1:

The responsibility for public health (water supply) rests with the state regulatory agencies. The U.S. Army suggests you contact the MPCA and/or the Minnesota Department of Health for a response.

COMMENT NO. 2:

Who is paying to insure it is clean? How much has it cost? How much will it continue to cost?

RESPONSE NO. 2:

See response G.1. The responsibility for the U.S. Army's IRP is within the U.S. Army Materiel Command (AMC). Funding for the IRP is determined by Congress which approves the U.S. Army budget. Approximately $18 million ($12 million by the U.S. Army and $6 million by Honeywell, Inc.) has been spent to date. An estimate for future costs cannot be made at this time until the extent of remedial actions has been determined utilizing the SARA process.

COMMENT NO. 3:

Is the cleanup plan technically sound and sufficient to remove contamination from the sources and the aquifers and thus remove the threat to health and environment?

RESPONSE NO. 3:

The TCAAP GRP, in whole, will address the regional groundwater contamination problem emanating from the Plant. The total extent of contamination has not been defined in areas beyond the Plant boundary, specifically in the western New Brighton area and areas in the southwestern direction. The extent will be determined by the TCAAP RI/FS currently being conducted by the U.S. Army. The acquisition of this data will enable a technically sound program to address the regional groundwater contamination program. Contamination at the southwest boundary of TCAAP is defined in detail allowing for the BGRS to effectively remove contamination from this area.

COMMENT NO. 4:

Given that the general public does not have the time or resources or expertise to fully understand all legal and technical issues surrounding the TCAAP, we often rely on MPCA and EPA to represent our interests. Will the Army, a Federal agency, accept the terms and conditions demanded by the EPA and MPCA (hence the public), if they determine the cleanup plan is inadequate?

RESPONSE NO. 4:

The BGRS is proposed as an interim remedial action. Pursuant to Section 10 of Executive Order 12580, the Administrator of the EPA must concur only with the final TCAAP remedial action. The U.S. Army will, however, seek EPA's concurrence on the initiation of the BGRS operations.

COMMENT NO. 5:

If not, or if agreements cannot be reached regarding specific or general issues, who will be able to tell the Army what improvements are to be made in the plan or the system (including nonspecific improvement items)?

RESPONSE NO. 5:

See response G.4, above.

COMMENT NO. 6:

What assurances are there that the Army will meet applicable cleanup criteria and standards?

RESPONSE NO. 6:

The ROD for the BGRS will identify the legally applicable or relevant and appropriate standards, requirements, criteria, or limitations to which the BGRS will conform. Minnesota may enforce any Federal or state standard, requirement, criteria, or limitation which is legally enforceable to which the BGRS is required to conform under Section 121 of CERCLA.

COMMENT NO. 7:

"Provisions to modify the Phase I: BGRS to ensure capture of VOC contaminated groundwater in the Hillside and Prairie du Chien/Jordan sandstone aquifers at the southwest boundary at TCAAP following startup and operation of the system."

What are the provisions to modify Phase I: BGRS to ensure capture of VOC's?

Will this include removal from Prairie du Chien/Jordan? And at what level?

RESPONSE NO. 7:

See response Exhibit A.4.

COMMENT NO. 8:

EPA Quality Criteria for Water 1986:

"For the maximum protection of human health from the potential carcinogenic effects of exposure to TRCLE through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero, based on the non-threshold assumption for this chemical."

Since TRCLE and other VOC's are not naturally present in the Prairie du Chien/Jordan Aquifer and Hillside Sand Aquifer, why should there be any amount allowed to be left in the system?

RESPONSE NO. 8:

EPA has recognized that groundwater restoration is expensive and difficult - sometimes impossible to implement. This is due to the nature of the geohydrologic environment and limitations of existing technologies. SARA takes these factors into account, in addition to public health and environmental effects, by utilizing the RI/FS process. Within this process "a risk assessment" type study is conducted in order to determine the appropriate contaminant cleanup level. This process allows for adoption of cleanup levels which allow contamination to remain in the aquifer. This assessment will be conducted as part of the U.S. Army TCAAP RI/FS effort.

COMMENT NO. 9:

"The Environmental Protection Agency and the State of Minnesota have been consulted about the interim remedy. It has been determined that the treated effluent will meet all Federal and state promulgated legally applicable or relevant and appropriate requirements."

What level of consultation has occurred with EPA and the State of Minnesota?

RESPONSE NO. 9:

Efforts have continued to maintain a good level of coordination with the EPA and MPCA (monthly meetings) on the total groundwater remediation program. All feedback provided by MPCA and EPA is reviewed and, if possible, has been and will be incorporated into the plans/system.

COMMENT NO. 10:

If feedback is given by EPA and/or the State of Minnesota, will the Army incorporate the suggestions into the Plan/System?

RESPONSE NO. 10:

See response Exhibit G, 9.

COMMENT NO. 11:

"At this time there are hazardous substances but no known pollutants or contaminants, as defined by SARA crossing the boundary."

Please explain the difference between a hazardous substance (Minnesota definition or EPA definition?), and a SARA defined "pollutant or contaminant":

"(33) The term 'pollutant or contaminant' shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the

environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; except that the term 'pollutant or contaminant' shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of paragraph (14) and shall not include natural gas, liquified natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas)."

RESPONSE NO. 11:

The interim response decision record uses the terms "hazardous substance" and "pollutant or contaminant" as they are defined in CERCLA. Section 101(4) of CERCLA defines hazardous substance in general as substances specifically identified in CERCLA or other environmental statues as hazardous or toxic. Section 101(33) defines "pollutant or contaminant," generally as substances which produce certain identified adverse health effects.

COMMENT NO. 12:

Provide a list of SARA defined "pollutant or contaminant" if possible.

RESPONSE NO. 12:

There is no list of such "pollutants or contaminants." This request should be more appropriately directed to the EPA.

COMMENT NO. 13:

"Establishment of water quality criteria to determine the necessary extent and degree of remediation for groundwater migrating off TCAAP is not part of this interim ROD. Such determinations will be based on ARARs or a risk-based number and will be included in the final RI/FS and ROD. This action is being taken to provide immediate protection to public health pending approval of the final Remedial Action for TCAAP."

What does this mean? It sounds as if the Army does not plan to meet water quality criteria until the final RI/FS. Are the ARARs applicable to this interim measure? If so, to what extent? If not, why not?

RESPONSE NO. 13:

Development of ARARs within the ROD was done to address the discharge of treated water from the BGRS and meet legally enforceable water quality criteria. The extent of groundwater cleanup will be addressed under the TCAAP GRP in a three-phased manner as discussed in the public meeting. The degree of groundwater capture estimated for the BGRS is 10 ppb for TRCLE. The U.S. Army will adopt the TRCLE MCL of 5 ppb as an appropriate capture criteria and will address system modification, if required, after the evaluation of the 90-day trial period.

The U.S. Army does plan to meet legally enforceable standards for discharge from the BGRS. The extent of groundwater cleanup is a complex issue that requires evaluation of regulatory, technical, and economic factors which will be performed in the TCAAP RI/FS prior to the commitment of considerable funds, the amount of which is strongly affected by the degree of groundwater cleanup.

COMMENT NO. 14:

"The U.S. Environmental Protection Agency and the Minnesota Pollution Control Agency have been contacted for input on ARARs for the Phase I: BGRS."

How long did the EPA/MCPA have to input to the ARAR process? Were other Minnesota agencies such as MN Department of Health, and MN Department of Natural Resources contacted? If not, why not?

RESPONSE NO. 14:

Request was furnished to EPA (4 May 87) and MPCA (28 Apr 87). The U.S. Army assumed that the MPCA would coordinate with other state agencies.

COMMENT NO. 15:

The Citizens for a Better Environment (CBE), would like copies of EPA, MPCA, MDH, DNR comments.

RESPONSE NO. 15:

All comments by an agency, group, or individual and the U.S. Army's respective responses on the BGRS will be available for review at the three information repositories. These comments and the responses will also be included in the final ROD on the BGRS.

COMMENT NO. 16:

"Any promulgated standard, requirement, criteria, or limitation under a state environmental law that is more stringent than any Federal standard, of general applicability, enforceable by the state, and has been identified by the state to the Army in a timely manner." What is a timely manner?

RESPONSE NO. 16:

A timely manner implies that the state must identify more stringent requirements to the U.S. Army in time for them to be considered in the determination of legally applicable or relevant and appropriate standards which should be applied to a remedial action under the circumstances of the release.

COMMENT NO. 17:

(From proceeding question): How much time did the Army allow EPA, MPCA, and others to input? Explain any differences between the time associated with a timely manner and the time allowed EPA/MPCA if the latter was less?

RESPONSE NO. 17:

All agencies, groups, and individuals were given the same amount of time, a 21-day public comment period, to provide the U.S. Army with comments on the BGRS.

COMMENT NO. 18:

Will the Army comply with future state or Federal promulgated standards, requirements, criteria, or limitations? If not, why not?

RESPONSE NO. 18:

The BGRS will comply with existing standards, requirements, criteria, or limitations. Future standards, requirements, criteria, or limitations will be considered in the TCAAP RI/FS and selection of a final remedy.

COMMENT NO. 19:

Will the Army comply with such future requirements (etc.), if they are more stringent? Less stringent? Please explain if the Army will comply with less stringent requirements (etc.), but not more stringent requirements (etc.).

RESPONSE NO. 19:

See response Exhibit G, 18.

COMMENT NO. 20:

"Only substantive requirements may be ARARs. Procedural requirements such as permits, notices and reporting requirements in Federal and state laws do not apply to CERCLA response actions."

Please explain what is meant by a substantive requirement. What is the difference between substantive and procedural requirement? Where does the threshold lie? What is the basis of this threshold?

RESPONSE NO. 20:

Substantive requirements are objective, definable limits, criteria, and standards, established by law or regulations, applicable to pollutants or contamination. Procedural requirements are actions required to be performed, such as obtaining permits, inspections, or monitoring.

COMMENT NO. 21:

Does the Army have flexibility in accepting procedural requirements? If so, to what degree? Has the Army exercised flexibility with any requirement at the TCAAP or elsewhere?

RESPONSE NO. 21:

Section 121 of CERCLA specifies the substantive requirements the U.S. Army must meet with the BGRS. The U.S. Army does not have any flexibility in not applying

for or accepting permits for onsite response action: however, the U.S. Army could agree to exchange data similar to monitoring and reporting requirements.

COMMENT NO. 22:

"Federal ARARs: National Primary Drinking Water Regulations at 40 CFR Parts 141 and 142, issued pursuant to the SDWA, particularly the Promulgated and proposed Maximum Contaminant Levels (MCLs) and MCLGs issued as part of these regulations. These are listed at Table 1."

RE: MCLG/MCL: If the MCGL is not zero, and the MCLG is not equal to the MCL, which value will the Army use, the MCLG, the MCL, the more restrictive, or the less restrictive?

Explain the rationale for the determination of which value to use. Please explain Table I Footnote No. 7.

RESPONSE NO. 22:

For the organic compounds listed in Table 1 of the ROD, the proposed or final MCL will apply except for 1,2-Dichloroethylene for which only a MCLG has been proposed. MCLs will be applied to inorganic requirements.

COMMENT NO. 23:

"Maximum Contaminant Level Goals (MCLGs) for Organic Contaminants, 40 C.F.R. 141.50 (formerly Recommended Maximum Contaminant Level). Zero Level MCLG have been determined not to be relevant and appropriate requirements." Who has determined that zero level MCLGs have been determined to not be relevant and appropriate requirements? If the source is not the Army, does the Army agree with this determination? .

RESPONSE NO. 23:

Maximum contaminant level goals are health-based goals promulgated under the Safe Drinking Water Act for public water systems, not groundwater. They are not legally enforceable and therefore are not legally applicable. Section 121(d)(2)(A) states that remedial actions shall attain MCLG where such goals are relevant and appropriate under the circumstances of the release. Zero level MCLG are technically impossible to attain or monitor. Additionally, since the aquifers contaminated by TCAAP are potential drinking water sources, under the circumstances at TCAAP, the effluent from the BGRS should be treated to the enforceable drinking water standards, that are the MCLs.

COMMENT NO. 24:

"Minnesota State ARARs: 3. Minnesota Water Quality Standards, 6 Minnesota Code of Agency Rules, Part 4, Sections 4.8014,- 8015,-, .8024 and -.8025."

This reference to MN Water Quality Standards (MN WQ STDS) is obsolete, current MN WQ STDS are outlined in MN Rules, Ch 7050 (waters of the state) and 7060 (underground waters) which have been such for 3 years now. This use of dated material casts a shadow of doubt over the credibility of the rest of the

document. And even so, WPC 22 (currently Ch 7060) "classification of underground waters of the state and standards for waste disposal" was omitted. Please explain this omission.

RESPONSE NO. 24:

The references to Minnesota Water Quality Standards has been corrected to include Minnesota Rules Chapters 7050 and 7060. The State of Minnesota has been given the opportunity to submit ARARs relevant to the BGRS. The numerical standards of Chapter 7050 are based on Federal primary and secondary drinking water standards. The discharge to the sand and gravel pit will meet any substantive, promulgated objective standard in Chapters 7050 and 7060 that is an ARAR under the circumstances of discharging treated waters to the sand and gravel pit.

COMMENT NO. 25:

"Raw Water Supply: Given that the treated water may be used as a water supply, treatment of extracted groundwater to meet drinking water standards and criteria was considered relevant and appropriate and is listed on Table 1. The basis for values listed on Table 1 is provided under existing or proposed Federal regulation or water quality criteria documents. There are not existing Minnesota drinking water standards and criteria which are legally enforceable."

While the Federal government has established a 10^{-5} carcinogenic risk level, the State of Minnesota uses a 10^{-6} risk level. Why were the Minnesota levels not chosen?

RESPONSE NO. 25:

The U.S. Army has decided that all treated water will be used for aquifer recharge and will no longer consider use as a water supply.

COMMENT NO. 26:

At the public meeting a MDH staff person said there were enforceable standards. Are there or are there not? MDH needs to comment on this. All enforceable standards should be incorporated.

RESPONSE NO. 26:

Item noted. The U.S. Army does agree that the Minnesota Department of Health needs to comment on this question. The ROD includes all ARARs appropriate to the BGRS.

COMMENT NO. 27:

"It is noted that these ARARs are considered conservative since a portion of the treated water...is...treated by activated carbon located at supply wells on the plant."

What does this statement mean? Having reviewed EPA's Carbon Adsorption Isotherms for Toxic Organics it was found that removal of TRCLE is inefficient compared with numerous other toxic organics. The absorption capacity of the

organics ranged from 0 to 11,300 with TRCLE rating 28 mg/g. How effective then will the carbon system be at removing TRCLE and other VOCs at low (5- 30 ug/l) concentration range? What type of carbon system is being used, i.e., GAC, powdered, etc.? How much carbon will be used to treat the VOCs. To what level will they be treated? Is the carbon new or regenerated? What is done with the spent carbon?

RESPONSE NO. 27:

See response, Exhibit G.25.

COMMENT NO. 28:

What other treatment options were considered besides the air stripping and carbon treatment system? Examples would be thermal degradation and oxidation.

RESPONSE NO. 28:

Five treatment alternatives were evaluated in the GRPP. The alternatives were carbon treatment, air stripping, or a combination of the two methods. No other alternatives were introduced for evaluation on the basis that carbon treatment and air stripping are proven technologies for removal of VOCs from groundwater. They have been shown by this study and others to be the most effective and economical technologies which can attain high VOC treatment efficiencies.

COMMENT NO. 29:

"Surface Water Discharge: ARARs for treated water to discharge to Rice Creek are established under 6 MCAR 4.8014 and 4.8024 which established standards for intrastate waters of Minnesota. Rice Creek is identified for use as a Class C domestic consumption stream, a Class B fisheries and recreation stream, and a Class B industrial consumption stream. Where specific criteria were common to two or more listed classes, the more restrictive value was applied. Table 2 lists the ARARs for Rice Creek. The treated water from the BGRS will meet these standards except for the possible exception of manganese which is naturally high in groundwater in the TCAAP area. The Minnesota water quality standards for Rice Creek do not include limits for volatile organic compounds. Water quality criteria for aquatic life not included in the Minnesota water standards for Rice Creek are not considered relevant and appropriate in these circumstances."

Rice Creek

Restating, references to 6 MCAR 4.8014 and 4.8024 are obsolete. Current Standards (STDS) are stated in MN Rules Sh 7050. The table of STDS for Rice Creek is incomplete and at least should include the total Chromium value of 0.05 mg/l.

RESPONSE NO. 29:

See response Exhibit B.15 and Exhibit E.2.

COMMENT NO. 30:

MN

Have the impacts of the high manganese levels been assessed? What will the impacts be?

VOC Standards

While there are not set numbers in MN Rules for VOCs, there are relevant sections which allow MPCA to set STDS on a case-by-case basis including MN Rules 7050.0210 STANDARDS FOR DISCHARGERS TO WATERS OF THE STATE, and MN Rules Ch 7050.0220 SPECIFIC STANDARDS OF QUALITY AND PURITY FOR DESIGNATED CLASSES OF WATERS OF THE STATE. Specifically Ch 7050.0210 Subp 6, Minimum secondary treatment: Unspecified toxic or corrosive substances - None at levels acutely toxic to humans or other animals or plant life, or directly damaging to real property.

Subp 9, Water quality based effluent limitations. Notwithstanding the provisions of subparts 8 and 16, the agency may require a specific discharger to meet effluent limitations which are necessary to maintain the water quality of the receiving water at the standards of quality and purity established by this part.

RESPONSE NO. 30:

Manganese in the TCAAP area as determined under the IRP has been found in concentrations throughout the groundwater system. This indicates that manganese is naturally occurring and is not due to industrial activities at the Plant. The operation of the BGRS will not affect the distribution of manganese during treatment. The treated water will be returned to the groundwater system via the sand and gravel pit, where once again, manganese is naturally occurring.

COMMENT NO. 31:

Subp 14. Undefined toxic substances. Questions concerning the permissible levels, or changes in the same, of a substance or combination of substances, of undefined toxicity to fish or other biota shall be resolved in accordance with the latest methods recommended by the EPA. The agency shall consider the recommendations of the Quality Criteria for Water, EPA 1976, in making determinations under this section. Toxic substances shall not exceed one-tenth of the 96 hour median tolerance limit (TLM) as a water quality standard except that other application factors shall be used when justified on the basis of available scientific evidence.

Ch 7050.0220.

Class 1 Water: In addition to the above listed standards, no sewage, industrial waste, or other wastes, treated or untreated, shall be discharged into or permitted by any person to gain access to any waters of the state classified for domestic consumption so as to cause any material undesirable increase in the taste, hardness, temperature, toxicity, corrosiveness, or nutrient content, or in any other manner to impair the natural quality or value of the waters for use as a source of drinking water.

Class 2 Water: No sewage, industrial waste, or other wastes shall be discharged into any of the waters of this category so as to cause any material change in any other substances or characteristics which may impair the quality of the waters of the state or the aquatic biota of any of the above listed classes or in any manner render them unsuitable or objectionable for fishing, fish culture, or recreational uses. Additional selective limits or changes in the discharge bases may be imposed on the basis of local needs. Aquatic life criteria needs to and may be considered based on scientific information (see 7050.0210, subp 14)

As EPA quality criteria for water 1986 are scientifically based they may be used by MPCA in setting standards and levels.

The Army needs to acknowledge that these standards do exist and needs to comply with subsequently determined limits.

RESPONSE NO. 31:

See response Exhibit B.15.

COMMENT NO. 32:

"Air emissions: There are no known Federal or state ambient air quality standards which are legally applicable to the emission of VOCs from the Phase I: BGRS treatment system. The emissions form the Phase I BGRS: (facility) for VOCs in air are estimated to be below any known regulated levels. Therefore, there are no known air ARARs for the Phase I: BGRS."

This is a contradictory statement. How can an emission level be below a level which does not exist? Having briefly reviewed MN Rules Ch 7005.0900 Air Pollution Control - Standards of Performances for Odorous Emission, we have found at least one section that is applicable.

Also, even though emissions are below regulated levels, when the regulated level exists, it is an ARAR and should be identified as such. (i.e., future emissions may exceed such a level!)

RESPONSE NO. 32:

No specific emission limitations for VOCs have been established by the EPA or the MPCA. The BGRS, by itself would be exempt from regulation by the MPCA. However, Minnesota Rule 7001.1210 requires a permit for a total emission facility with potential emissions of a single criteria pollutant of more than 25 tons per year. While VOCs themselves are not a criteria pollutant, they contribute to the formation of ozone, a criteria pollutant. If the total potential VOC emissions from the installation restoration facilities will exceed 25 tons per year, the U.S. Army will establish Best Available Control Technology, in consultation with the MCPA, to reduce total VOC emissions from installation restoration facilities to less than 25 tons per year.

COMMENT NO. 33:

As MN is now in the process of revising its Air Toxics strategies, and that additional restrictions may be imposed in the near future, will the Army comply with future promulgated regulations? If not, why not?

RESPONSE NO. 33:

The ROD for operating the BGRS will be based on current ARARs. Any future air restriction will be evaluated for possible application to the BGRS, and the TCAAP RI/FS and final remedial action will be based on ARARs existing at the time of that decision.

COMMENT NO. 34:

Where did the 10 ppb level come from? What is the number based on?

RESPONSE NO. 34:

See response Exhibit F.2. See also Exhibit A.1 and Exhibit A.2.

COMMENT NO. 35:

Please comment on the level of compliance with the original NPDES/SDS Permit (before modification).

RESPONSE NO. 35:

Non-compliance of the recently issued NPDES Permit for the Building 103 discharge to Rice Creek was in connection with the lateness of monitoring reports. That lateness was approximately 2 or 3 days. During the time that the system has been in operation it has met effluent requirements. Problems at the air stripping tower in this collection and treatment system caused it to be closed down until the tower could be rinsed and cleaned out. The system was shut down. The MPCA was notified. They were also notified when the system was put back into operation. It is operating at this time.

COMMENT NO. 36:

If not in compliance, explain types of noncompliance; explain duration of noncompliance; i.e., how long did the system operate while not in compliance? If not in compliance, outline corrective actions taken to date.

RESPONSE NO. 36:

See response Exhibit G.35.

COMMENT NO. 37:

Was the MPCA/EPA agency notified of the noncompliance immediately (or as per required), when such a determination was made? If not, why not?

RESPONSE NO. 37:

See response Exhibit G.36.

COMMENT NO. 38:

If there was noncompliance, understanding that the current system is significantly less complex than proposed, what guarantee is there that the proposed system will perform at levels desired by the Army and required by EPA and MPCA?

RESPONSE NO. 38:

The U.S. Army will monitor the performance of the BGRS and make appropriate modifications to assure it achieves its design criteria. The EPA and MPCA will be provided information on its performance. Under Section 121(e) of CERCLA, Minnesota can sue to enforce compliance with any requirement, criteria, standard, or limitation to which the BGRS is required to conform.

COMMENT NO. 39:

Outline general procedural steps to be taken if system under-performs; i.e., Will MPCA/EPA be notified if so, when? If not, why not? Will the public be notified? If so, when? If not, why not?

RESPONSE NO. 39:

See response Exhibit B.3.

COMMENT NO. 40:

Does the Army intend to accept and comply with the terms of the modified NPDES permit? What portions of the permit if any does the Army not plan on complying with? Why not?

RESPONSE NO. 40:

The U.S. Army is following procedures under SARA to address the regulatory requirements for the BGRS. SARA specifically states, "No permits are required to conduct remedial actions on the site." The NPDES permit process is not appropriate under these regulations. See response, Exhibit B.3.

COMMENT NO. 41:

What are the responsibilities of Honeywell and Federal Cartridge Corporation (FCC), regarding cleanup and liability at the TCAAP, i.e., funding, staffing, etc.?

RESPONSE NO. 41:

The responsibilities of Honeywell and FCC regarding cleanup areas follows:

Honeywell - Honeywell (industrial tenant at TCAAP) has entered into a cooperative agreement with the U.S. Army to identify contamination, address the magnitude and extent of contamination beyond the TCAAP boundaries, and assist in groundwater remediation. Honeywell is responsible for funding cleanups associated with their operations, Buildings 103 and 502.

FCC - FCC is the operating contractor of TCAAP and is responsible for operation of the facility. FCC acts as an agent for the U.S. Army and conducts activities under U.S. Army direction. FCC is not funding any cleanup activities at TCAAP.

COMMENT NO. 42:

CBE does, however, wish to express the following concerns regarding the Draft Compliance Agreement:

RESPONSE NO. 42:

The CBE comments were provided to the U.S. Army group working on the Compliance Agreement. However, since that time, the agreement has undergone significant revisions and is still being negotiated between the U.S. Army, EPA, and MPCA.

EXHIBIT H

LETTER

Minnesota Department of Natural Resources
500 LaFayette Road
St. Paul, Minnesota 55155

01 June 1987

EXHIBIT H: Letter, Minnesota Department of Natural Resources, 500 LaFayette Road, St. Paul, Minnesota 55155, 01 June 1987

COMMENT NO. 1:

A question has arisen concerning the timing of the installation of additional remedial measures. If the testing of the system shows, for example, that sufficient "upwelling" from the Unit 4 aquifer is not occurring, will you be able to install an additional well or wells this year or will you have to wait for another budget cycle to get the funding? Any delay in improving the system, if it is shown to be necessary, would not be in our mutual best interest.

RESPONSE NO. 1:

Statement noted. Funds are available and no delays will occur due to budget cycle constraints.

COMMENT NO. 2:

Two questions arose out of the May 20 public meeting: Was a permit secured for the construction of the rock outfall structure to Rice Creek and was the graphic showing seven (7) wells for the extraction system in error? In the public presentation, a slide was shown of a rock outfall structure. In a preliminary review of our permit records, we do not find a permit has been issued for that structure as required by Minnesota Statutes 105.42.

RESPONSE NO. 2:

No permit was requested for the construction of the rock outfall structure to the TCAAP drainage ditch. The GRPP included a review of permits. This review indicated that no construction or building permits were necessary on TCAAP. Comments on the GRPP by the MPCA did not identify that any permits were needed.

The BGRS graphic showed six (6) extraction wells. However, a seventh extraction well exists and is operated at Building 502. A permit is already been issued for the well at Building 502 (#86-6227).

EXHIBIT I

LETTER

Verbal questions/statements
from the public hearing

21 May 1987

EXHIBIT I: Verbal questions/statements from the public hearing on 21 May 1987.

All questions were either answered at the public hearing, not germane to the BGRS, or later submitted in writing and addressed as individual exhibits.

EXHIBIT J

LETTER

Preserve Our Land
P. O. Box 456
Little Falls, Minnesota 56345

29 April 1987

EXHIBIT J: Letter, Preserve Our Land, P. O. Box 456, Little Falls, Minnesota 56345, 29 April 1987

COMMENT NO. 1:

What is the total volume of volatile organics that were improperly disposed of over the years at TCAAP? Specifically, which contractors are responsible; what buildings and/or on-base disposal sites are the organics coming from?

RESPONSE NO. 1:

Disposal of VOCs at TCAAP was done in accordance with disposal procedures acceptable at the time of occurrence. No improper disposal occurred or is occurring at TCAAP. The TCAAP Preliminary Assessment (PA) effort is currently ongoing at TCAAP to document disposal activities from historical records which will assist in better quantifying disposal at the sites at TCAAP. The TCAAP PA will be available to the public for review after completion this year.

COMMENT NO. 2:

Who will pay for cleanup costs associated with BGRS, TGRS, and PGRS? Who will pay for public and private contaminated water wells and when will payments be made?

RESPONSE NO. 2:

The results of past studies, the TCAAP RI/FS, studies by EPA, and MPCA, and any other relevant data will be used to determine the liability of the U.S. Army and other parties for contamination off the Plant. The results of past studies and the TCAAP RI/FS will be used to determine the liability of the U.S. Army for contamination off the plant. The U.S. Army has determined that contamination from TCAAP has affected the city of New Brighton municipal wells and negotiations are currently ongoing to reimburse damages resulting from the contamination.

COMMENT NO. 3:

According to "Report No. 129," "Installation Assessment of TCAAP," there were an unknown number of burial sites, settling ponds, etc., on the TCAAP site containing potentially hazardous materials. Have all of these areas now been investigated? If not, when will they be?

RESPONSE NO. 3:

Results of studies conducted by Honeywell and the U.S. Army have determined that 14 areas may have caused contamination problems at TCAAP. Major sites, namely Site D, Site G, Site I, and Site K, have been thoroughly addressed and response actions are initiated/ongoing at these areas. The remainder of the 14 sites have been investigated; however, additional study is required to determine the impact of these sites. The U.S. Army has identified the most severely contaminated sites at TCAAP.

COMMENT NO. 4:

Will base line or other types of health studies be done in the area encompassed by the 'pollution plume' as shown by the map in 'Volume I--Work Plan' by Camp Dresser and McKee entitled Approximate Extent of Known TCE Contamination In Prairie du Chien/Jordan System? If yes, who or what agency will be responsible for these studies?

RESPONSE NO. 4:

The TCAAP RI/FS will contain a "risk assessment" type study to address the effects of contamination on the public. The study will address the TCAAP and off-post areas affected by contamination originating from the Plant. The U.S. Army is responsible for conducting the TCAAP RI/FS.

COMMENT NO. 5:

Will communities in or near the area of aquifer contamination be given warnings (written or through the media) about possible negative health effects associated with consuming polluted water?

RESPONSE NO. 5:

The Minnesota Department of Health (MDH) is responsible for protection of persons and communities affected by contamination. The U.S. Army assumes that the MDH will provide this service. Data collected from field investigations are provided to the State of Minnesota.

COMMENT NO. 6:

What kind of oversight and/or regulatory role will the Minnesota Pollution Control Agency play in the BGRS and subsequent cleanup projects?

RESPONSE NO. 6:

The Superfund Amendments and Reauthorization Act of 1986 (SARA) delineates the state's role in remedial actions. In particular, SARA sections 120(f) and 121(f) provide the state with substantial and meaningful involvement in initiation, development, and selection of remedial actions. 10 USC 2705 provides the state with expedited notice of response proposals and an adequate opportunity to comment on proposals for response actions. Under section 121(e), Minnesota can sue to enforce compliance to which the BGRS must conform.

EXHIBIT K

LETTER

Metropolitan Waste Control Commission
350 Metro Square Building
St. Paul, Minnesota 55101

28 May 1987

EXHIBIT K: Letter, Metropolitan Waste Control Commission, 350 Metro Square Building, St. Paul, Minnesota 55101, 28 May 1987

COMMENT NO. 1:

Will the Building 502 groundwater be routed to the BGRS? (Approval to sewer the 502 groundwater will expire on 30 June 1987. See Minnesota Waste Control Commission (MWCC), December 17, 1986, letter to Mr. Clarence Oster).

RESPONSE NO. 1:

The Building 502 groundwater system may be routed to the BGRS following completion of the 90-day trial period of the system.

COMMENT NO. 2:

If yes to number 1, will this groundwater be treated, prior to joining the BGRS? And will this 502 water be connected to the BGRS upstream or downstream of the BGRS air strippers?

RESPONSE NO. 2:

The method by which the Building 502 groundwater system will be connected to the BGRS has not been determined. However, all water from the Building 502 system will be treated prior to discharge.

COMMENT NO. 3:

The Record of Decision did not address the maintenance of the BGRS air strippers. However, the NPDES Permit included a section on "Bypass to the Sanitary Sewer." Please respond to the following in terms of air stripper maintenance:

a. Will bypass to the sanitary sewer occur?

b. Will the groundwater and/or "backwash wastes" be (partially) treated prior to sewering?

c. What is the expected frequency and quantity of water/wastes sewered?

d. What are the expected levels of trichloroethylene and total volatile organic compounds in the water/wastes sewered?

RESPONSE NO. 3:

No bypasses are anticipated to go to the sanitary sewer. Should the towers need any kind of treatment, backwash wastes would be expected to be discharged to the sanitary system. The expected frequency and quantity of those waters is unknown. After the air stripper towers are in operation for a period of time,

with additional operational data, the maintenance plan will be developed to show the frequency, quantity, as well as any quality of waters which would go into the sewer system. Those sewer wastes would not be expected to have any type of volatile organic compounds. Should the air strippers cease operation, it is anticipated that only enough waters would be pumped to be used for the plant water supply.

COMMENT NO. 4:

Are there plans for handling the groundwater in the event that the air stripper(s) cease operating? If so, would the TCAAP expect to sewer the groundwater, either untreated or partially treated?

RESPONSE NO. 4:

The BGRS will not operate unless an acceptable treatment system is in operation prior to discharge. No groundwater is anticipated to go into the sewer system. Any modifications that will require the use of the sewer system will be coordinated with the MWCC prior to implementation.

EXHIBIT L

LETTER

Minnesota Department of Health
717 S.E. Delaware Street
P. O. Box 9441
Minneapolis, Minnesota 55440

29 May 1987

EXHIBIT L: Letter, Minnesota Department of Health, 717 S.E. Delaware Street, P. O. Box 9441, Minneapolis, Minnesota 55440, 29 May 1987

COMMENT NO. 1:

The statement "There are no existing Minnesota drinking water standards and criteria which are legally enforceable" contained on page 6 under the section entitled Raw Water Supply is incorrect. Minnesota Rules, Chapter 4720 contains legally enforceable drinking water standards applicable to public water supplies.

RESPONSE NO. 1:

The Minnesota Department of Health is correct. Minnesota Rules, Chapter 4720 do contain legally enforceable drinking water standards applicable to public water suppliers. However, there are currently no enforceable standards for VOCs such as TRCLE.

COMMENT NO. 2:

Section IV, Compliance With Identified ARARs, contains the conclusion that operation of the proposed Phase I: BGRS is estimated to intercept TRCLE in the Hillside Prairie du Chien/Jordan aquifers to the 10 ppb level at the southwest boundary of TCAAP. We find this level of containment to be unacceptable. As you acknowledge in other portions of the proposed ROD, the EPA has proposed maximum contaminant levels (MCLs) for eight volatile organic chemicals (VOCs), one of which is TRCLE. The proposed MCL for TRCLE is 5 ppb and when promulgated will require that community water systems and nontransient, noncommunity water systems, i.e., factories, schools and day-care centers, provide drinking water not in excess of the TRCLE MCL or any other MCL. The history of the TCAAP contamination site has certainly provided considerable evidence of the effects of contaminated groundwater moving offsite and severely impacting the water wells in New Brighton, St. Anthony, Arden Manor Mobile Home Park, and numerous private residences. Given this well-documented groundwater contamination migration from TCAAP, it is our position that the capture zone resulting from operation of the BGRS must intercept TRCLE at levels not to exceed 5 ppb and also capture other VOCs at or below their proposed MCL. To not set the limits for offsite contaminant migration at the proposed drinking water MCLs would potentially obligate the downstream recipients of the groundwater to provide treatment to meet the MCLs. This is a completely unacceptable situation to this Department since we feel that the responsibility for cleaning up drinking water to the proposed Federal standards lies with the contaminator at the contamination site. We feel the technology is available to intercept TRCLE and other VOCs at or below the proposed MCLs and that it should be implemented to provide an acceptable remedy to offsite contaminant migration.

RESPONSE NO. 2:

See responses to Exhibit A,2 and Exhibit A,3. The U.S. Army is very much interested in seeing any documentation demonstrating in a "real world" situation where VOCs have been removed from groundwater to the low levels proposed in your letter. Currently no data is available, to our knowledge, that demonstrates the level of capture of VOCs in a similar geohydrologic setting to that of TCAAP. The U.S. Army will adopt the TRCLE MCL as an appropriate capture zone criteria for the TCAAP BGRS.